[TAPGWTR1-UM-025V00-EN]

OTP Programmer User Manual

Rev 2.5.0
June 2011

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1 Introduction

The AppoTech OTP Programmer is a toolset to shorten the development time of the customers in order to help them quickly launch their products to market. The OTP Programmer allows user to download their custom written code onto their own application board. It also provides a user-friendly interface to customize application. The programmer is also able to do online programming, ideal for quick deployments in mass production environment.

This manual is written for the OTP Programmer version 2.4 RC or later.

Supported MCU
Please refer to the release notes for supported list of MCUs.

2 Preparation

The following items are required when using the OTP Programmer:

- Computer with USB port
- OTP Programmer Software
- OTP Programmer board
- USB cable

2.1 Upgrade Instructions

For existing user, with **firmware version 2.3 RTM2** or before, installing the **software version 2.3 RTM3** or later will not work with your existing firmware, please consult FAE to upgrade the firmware.

For existing user, with **software version 2.00.06** or before, and **firmware version 2.3 RTM3** or later), please follow these steps to upgrade your OTP programmer software:

Check Software Version

1. Start the application, verify the version in the main dialog
2. If the version is **2.00 or before**, continue with the followings

Check Firmware Version

1. Turn on the programmer board
2. After displaying voltage information, click program button twice
3. Verify the version on the LCD
4. If the version is 2.3 RTM3 or later, continue with the followings

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Update Software

1. Open control panel: “Start Menu” => “Settings” => “Control Panel”
2. Select “Add or Remove Program”
3. Select “AppoTech OTP Programmer” to uninstall the old application
4. Follow the section 3 to install the new application

Update Driver

1. Connect the OTP Programmer board to PC
2. Click PROGRAM button several times to enter program mode
3. Hold MODE button to enter read mode
4. Click MODE button to enter USB mode
5. The board will be detected by PC and the Hardware Wizard will popup to guide you to install the driver
6. In the dialog, select “No, not this time”, click “Next”
7. Select “Install the software automatically (Recommended)”, click “Next”
8. The driver will be updated automatically
9. Click “Finish” button to close the dialog

For existing user, if the project file created with software version **2.4 RTM** or before, conversion have to be done.

Convert project file

1. Open the OTP Programmer application **2.5**
2. Click “File” => “Open”
3. Select the project file to be open
4. A message box will ask for converting the project file.
5. Click “Yes” to convert.

Note:

Project conversion only support RAW object code data, project with encrypted object code data cannot be converted.

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3 Install Software

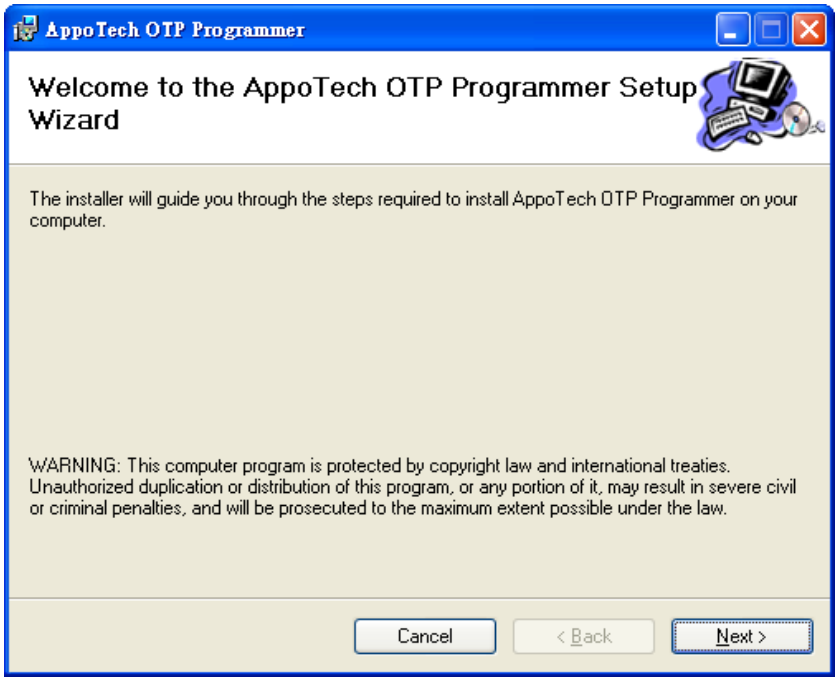
3.1 Installation

The OTP Programmer application works with OTP programmer board for user to download object code to AppoTech microcontroller devices. It allows user to configure MCU features, smart options, to suite user's application. In addition, it provides varieties of functions for production and project management.

- Please refer to release notes for supported lists of operating systems.

To install the OTP Programmer application, go to the setup file directory and double-click setup.msi. The following Setup dialog box should appear.

Welcome Screen


AppoTech OTP Programmer
Welcome to the AppoTech OTP Programmer Setup Wizard
The installer will guide you through the steps required to install AppoTech OTP Programmer on your computer.
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.
Cancel
< Back
Next >

Click **Next** until the installation program begins copying files.

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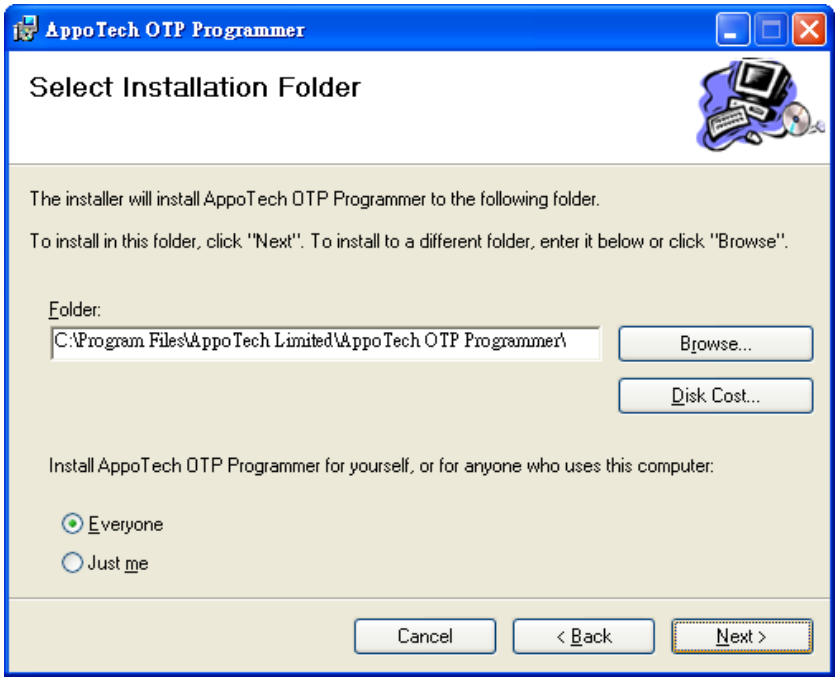
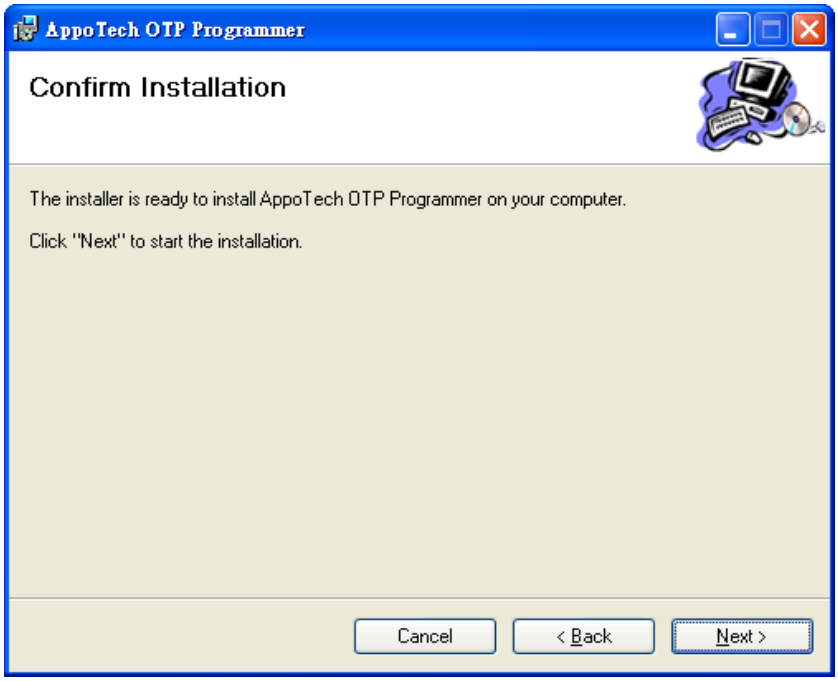
Select Installation Folder


AppoTech OTP Programmer
Select Installation Folder
The installer will install AppoTech OTP Programmer to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
Folder:
C:\Program Files\AppoTech Limited\AppoTech OTP Programmer\
Browse...
Disk Cost...
Install AppoTech OTP Programmer for yourself, or for anyone who uses this computer:
Everyone
Just me
Cancel
< Back
Next >

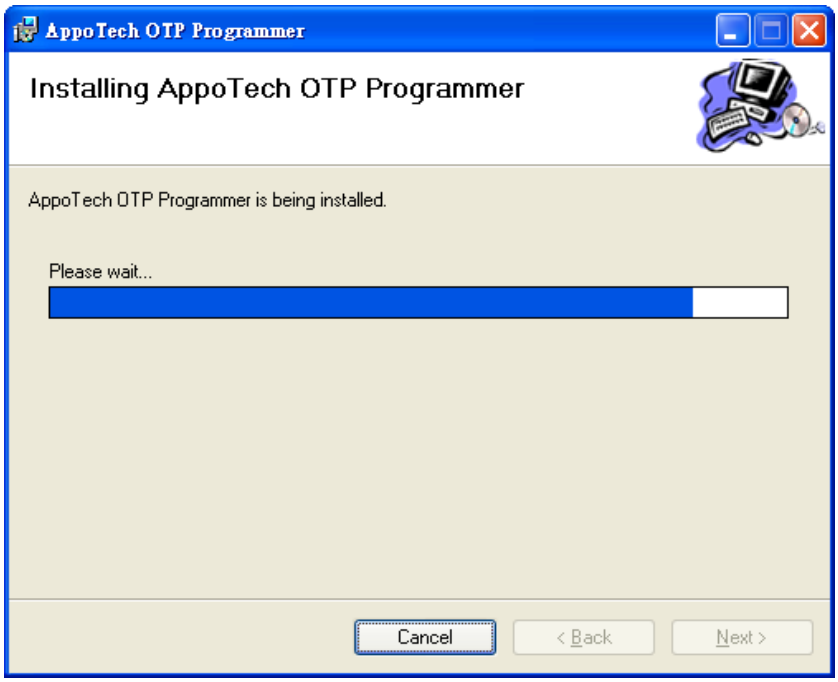
Browse	Click to choose the desired directory
Disk Cost	Click to show an overview of volume of disk drive

Click **Next**

Confirm Installation


AppoTech OTP Programmer
Confirm Installation
The installer is ready to install AppoTech OTP Programmer on your computer.
Click "Next" to start the installation.
Cancel
< Back
Next >

Click **Next,** the following screen should appear



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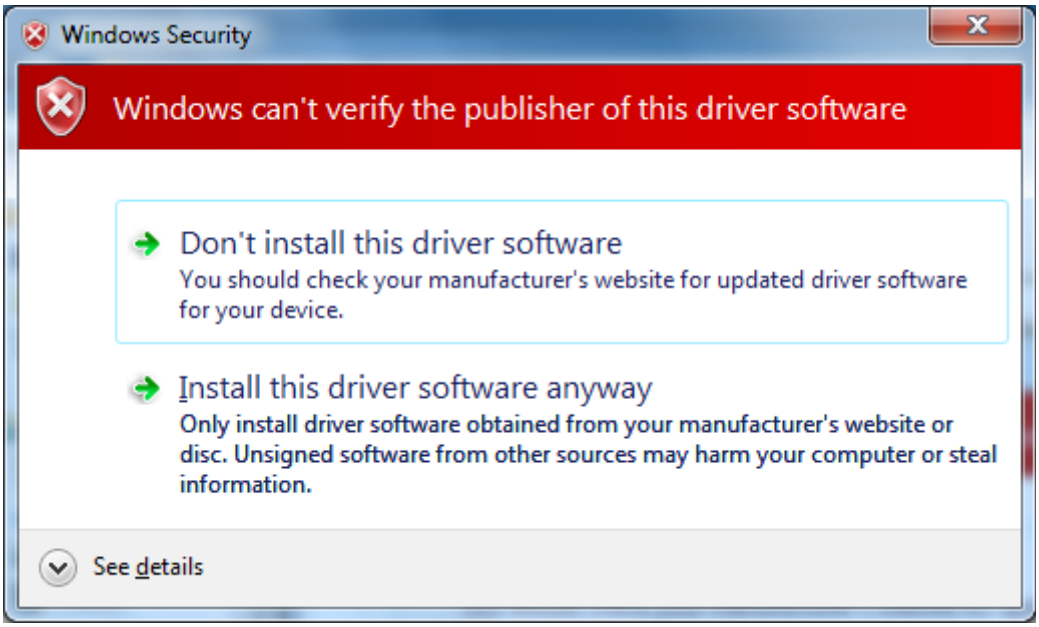
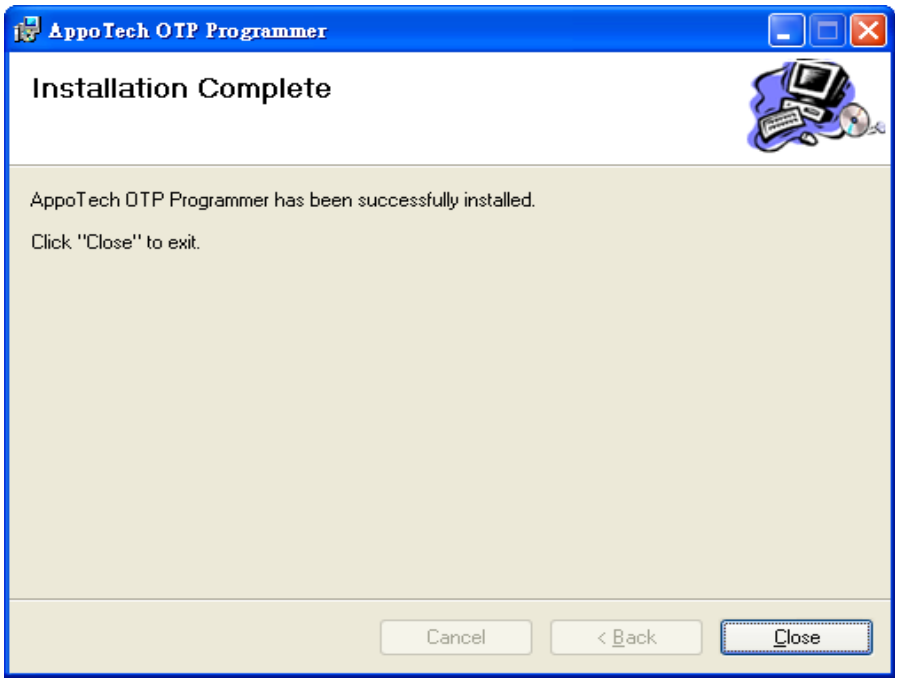
Note:

For Microsoft Window Vista / 7 Users, a warning dialog may appear. Click Install this driver software anyway to continue the installation.


Windows Security
Windows can't verify the publisher of this driver software
Don't install this driver software
You should check your manufacturer's website for updated driver software for your device.
Install this driver software anyway
Only install driver software obtained from your manufacturer's website or disc. Unsigned software from other sources may harm your computer or steal information.
See details

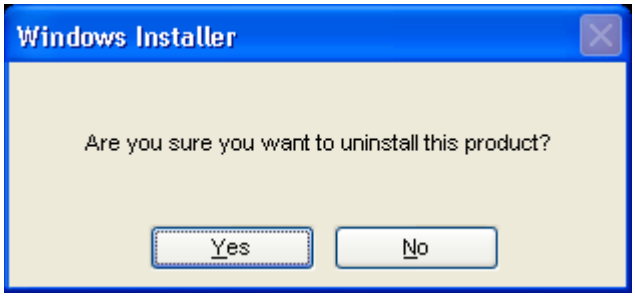
Wait until the installation finishes.



Click **Close** to complete the installation.

3.2 Uninstallation

Click **Start Menu** => **Programs** => **AppoTech** => **OTP Programmer**
Select **Uninstall AppoTech OTP Programmer**, the following screen should appear



Click **Yes** to uninstall the OTP programmer software

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4 Install Hardware

This procedure describes how to connect the OTP Programmer Platform and install the USB vendor specific class (VSC) drivers.

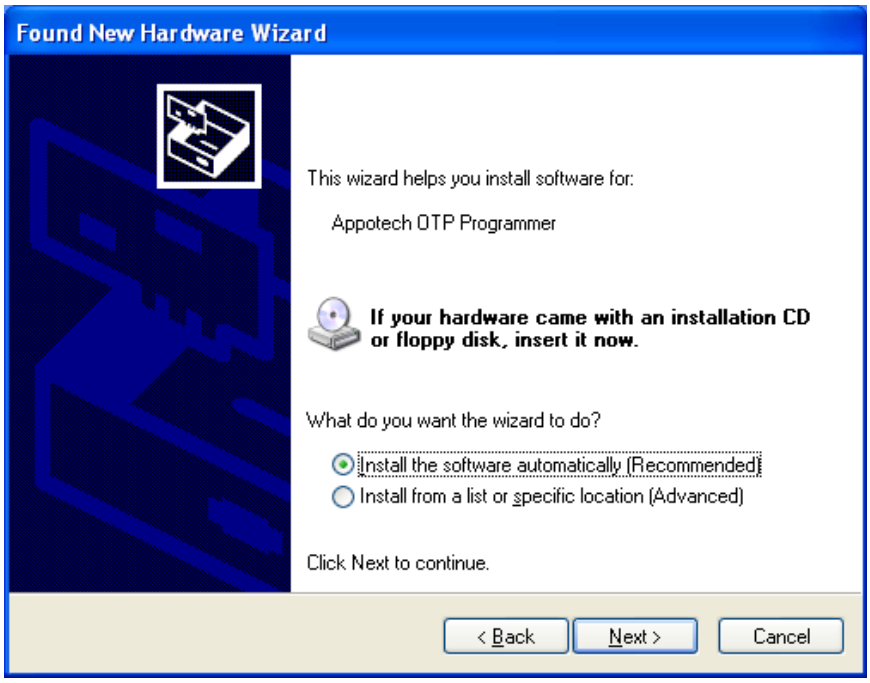
Verify the OTP Programmer board is set up according to the default configuration (See appendix I)
Insert the type B connector of a USB cable into the type B jack located on the OTP Programmer board, and insert the type A connector of a USB cable into a USB port on your computer.
On the OTP Programmer board, move the switch to ON position.

4.1 For Microsoft Window XP Users

After connecting the device to the computer, the Found New Hardware Wizard dialog box will appear.

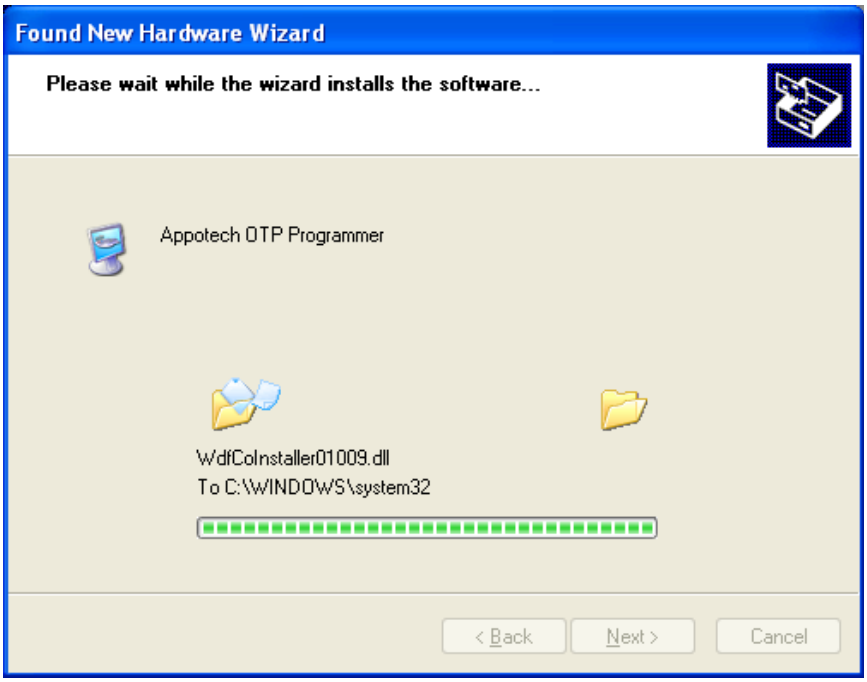
Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
< Back
Next >
Cancel

Select **No, not this time**, and click **Next**.


Found New Hardware Wizard
This wizard helps you install software for:
Appotech OTP Programmer
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

Select **Install the software automatically (Recommended)**, and click **Next**.

Then it will install the driver automatically.



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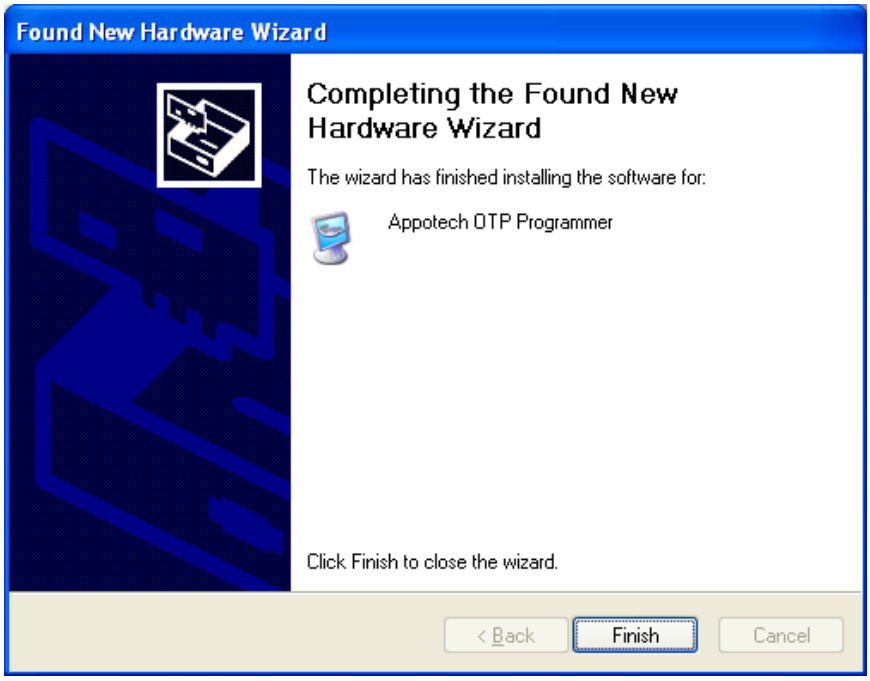
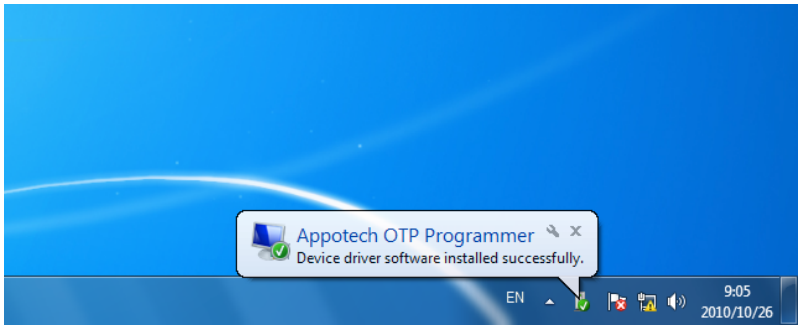
After finished installing the driver, this dialog will display.



4.2 For Microsoft Window Vista / 7 Users

After connecting the device to the computer, the driver will be installed automatically.



After the driver installation has completed, a notification will appear.

5 Software Issue

5.1 Start Application

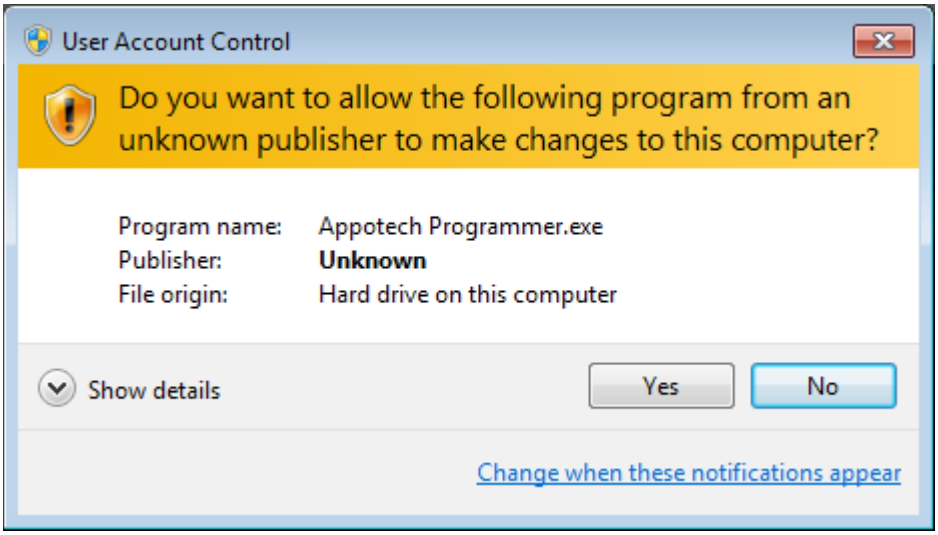
This procedure describes how to start the OTP Programmer application.

5.1.1 For Microsoft Window XP Users

Once the OTP Programmer application is installed successfully, user can find a shortcut link on the desktop. User can double click to start the application.

5.1.2 For Microsoft Window Vista / 7 Users

Once the OTP Programmer application is installed successfully in the Program Files, user can find a shortcut link on the desktop. User can double click to start the application. Then a dialog will popup to ask for the permission the start the program. Click Yes to start using the programmer.


User Account Control
Do you want to allow the following program from an unknown publisher to make changes to this computer?
Program name: Appotech Programmer.exe
Publisher: Unknown
File origin: Hard drive on this computer
Show details
Yes
No
Change when these notifications appear

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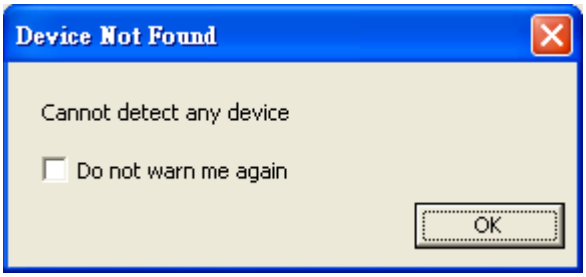
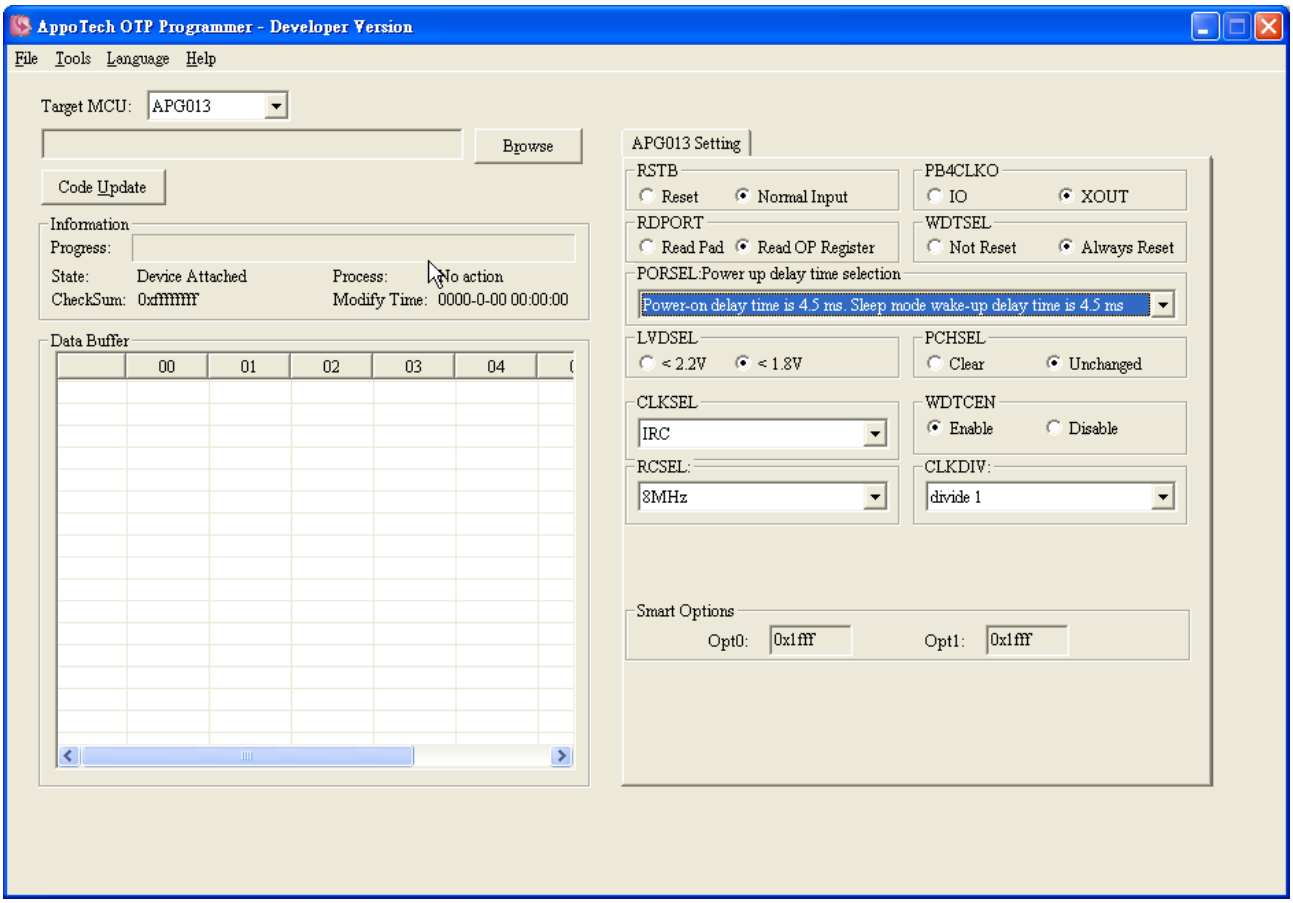
5.2 Connect / Disconnect Programmer Board

This procedure describes how to connect the OTP Programmer and disable the warning message. After user has started the application without connecting to the OTP Programmer, a warning message will appear.

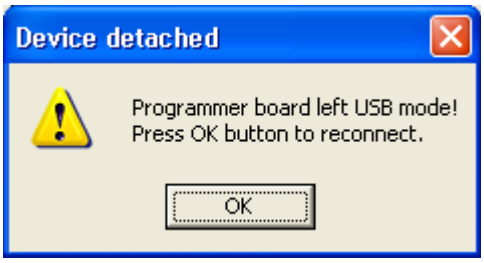


User can disable this pop up warning message by ticking the box, 'Do not warn me again'. Then click OK to quit.

When user powers on the programmer, the state of the OTP Programmer will change to “Device Attached”.



After the OTP Programmer is attached to the computer, the user can press the mode button to let the device to go to program mode. At the same time, a Reconnect Dialog will appear.



User can click OK to make the device go to USB mode again.

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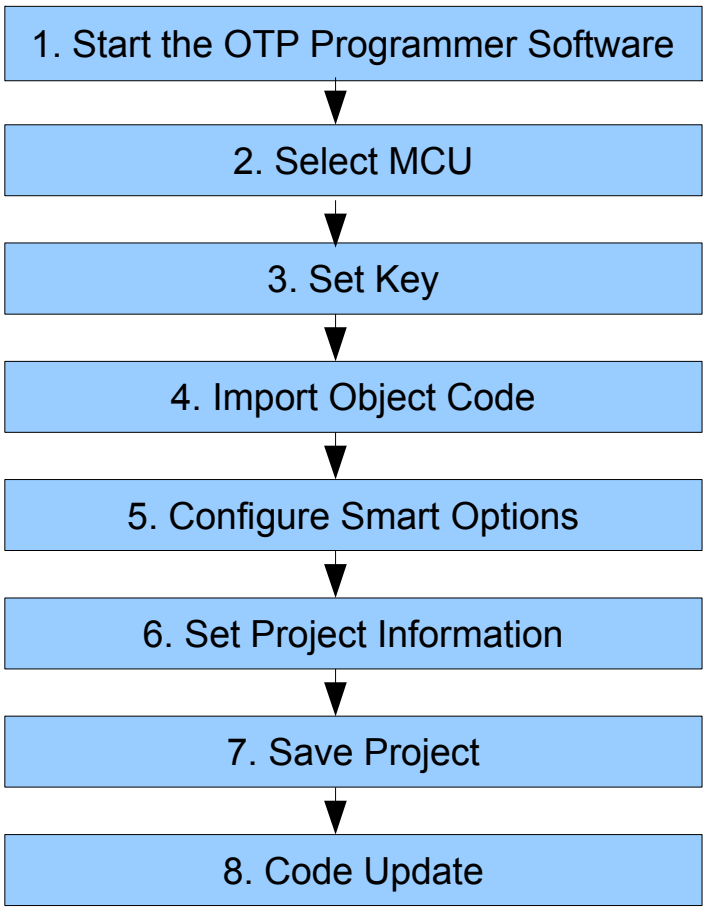
5.3 Build the Project

Workflow to Update Code



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5.3.1 Start the OTP Programmer Software

Target MCU	Select the MCU model needed for programming
Browse	Select the object file needed for programming
Code Update	Download object code to **flash** memory of programmer
Progress	Show the update progress
State	Show the state of the device
Process	Show the current task of programmer
CheckSum	Show the checksum value of object code
Modify Time	Show the modified time of the project file
Data Buffer	Show the data content of the object code
Setting	Show smart options of the target MCU

Note:

MCU is NOT yet programmed when Code Update is clicked.

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5.3.2 Select MCU

User can select the target MCU of their own target board. For supported list of MCUs please refer to the release notes.

5.3.3 Set Encryption Key

User can choose an encryption key to encrypt the programmer setting in order to protect the object code. Since the key has a length of 32 bytes, it will be prone to error if it is typed by hands. OTP Programmer provides an easy way to import a key by text file.

To set the encryption key, select **Tools** from the menu, then choose **Encryption**. Click **Browse** to import the file, verify the key imported, then press **Write** to save the setting. After receiving the successful message, press **OK** to leave.

User may also disable the encryption key by setting the key to none. However, it is not recommended. To set the key to none, select **Tools** from the menu, then choose **Encryption**. Select None for the security option and press **OK** to leave.

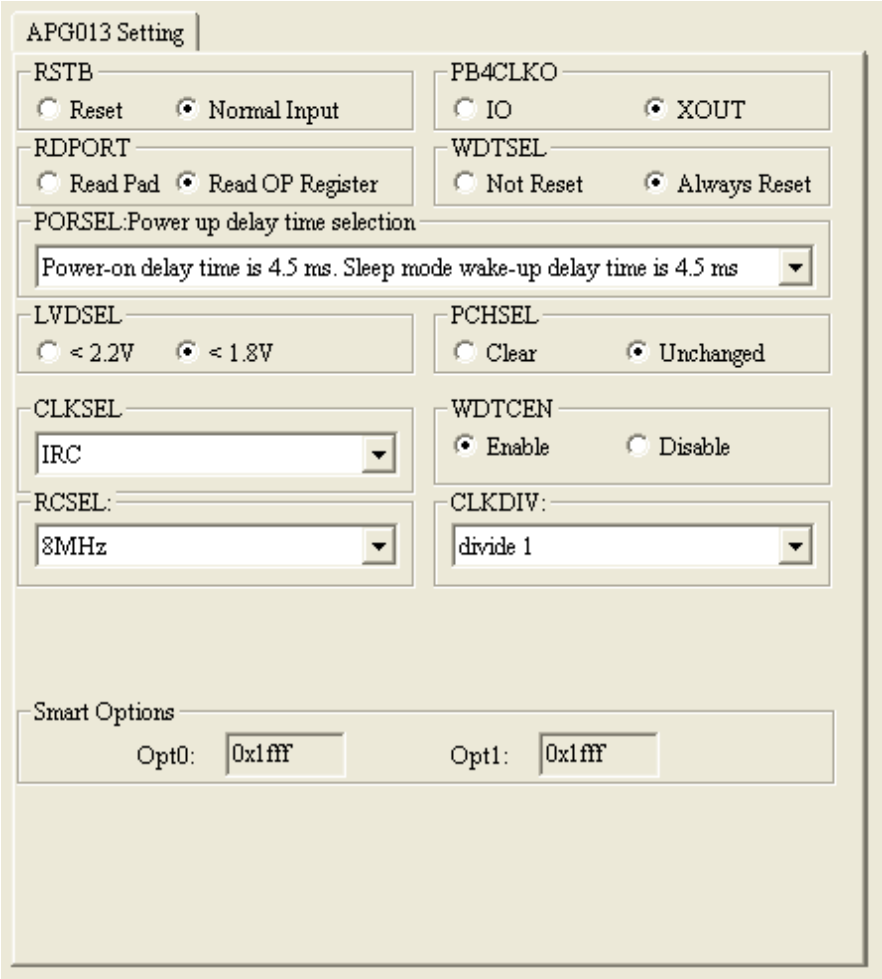
5.3.4 Import object code

This option allows user to import object code generated from the AppoTech IDE. For details of generation of object code please refer to the AppoTech IDE manual. To import object code, click **Browse** to open the dialog box in order to choose the object file. OTP Programmer can import obj or bin object code. For hex object code file, please refer to the application notes,”OTP Programmer - Application Note for Conversion of Hex to Bin”,to convert the hex file to bin file.

Note:

The Programmer will check the length of the object code. If the imported object code is larger than the limit of specific MCU (e.g. APG012, APG013, AX684B has a limit of 2048 bytes and AX688, AX688B and a limit of 4096 bytes), the extra code will be ignored by the programmer.

5.3.5 Configure smart options



Smart option allows user to configure the MCU feature easily by using click-and-select method to generate the correct code.

5.3.6 Set project information

For the ease of the management of project, the OTP Programmer allows user to define information to be stored in the programmer for later retrieval. The stored data can be displayed on the programmer LCD. Company Name, Project Code Version and Person in charge can be stored. It allows easy tracking of information in the production environment.

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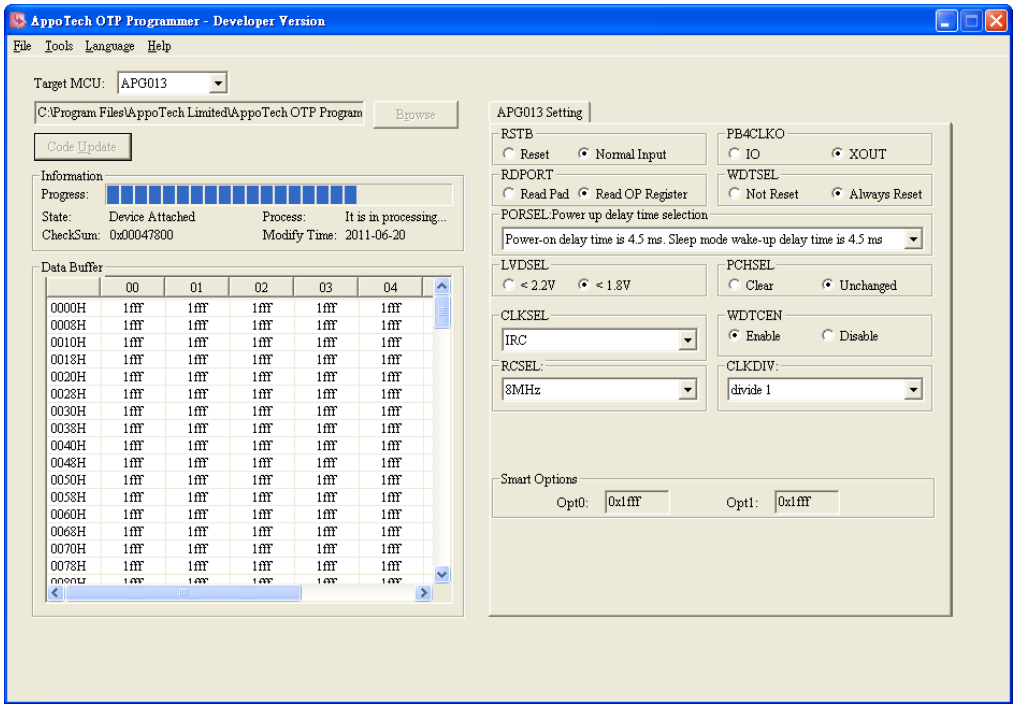
5.3.7 Save project

This option allows user to save the setting to be used on another programmer.

> **Note:**
> To be able to save the project, at least the object file must be imported **AND** the encryption key file must be specified.

5.3.8 Code update

This option allows user to download the object code into the flash memory of the programmer for programming.



Click **Code Update** to update the flash with new content. The process bar will show the status the programmer is in. After successful update, the following message will appear:

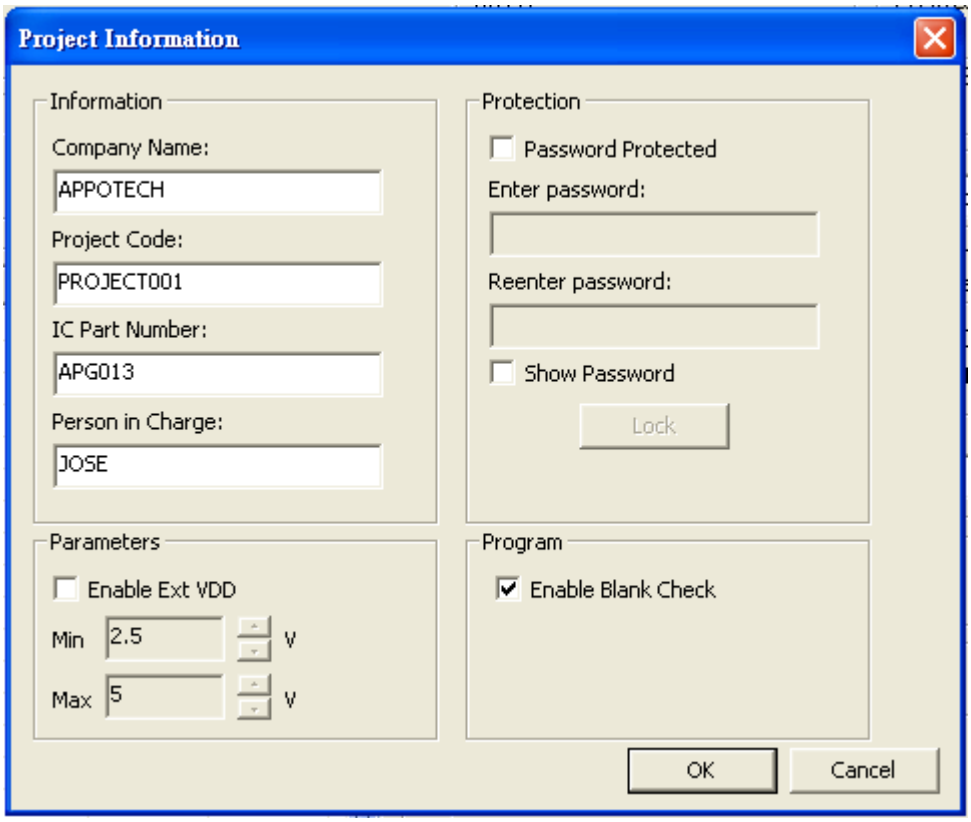
A “Download success!” message will appear if the code is successfully updated.

Note:

To be able to do the **Code Update**, the programmer must be in USB MODE **AND** is shown as “Device Attach” in programmer client state. For setting the programmer into USB MODE please refer to Chapter 6 Hardware Issues.

5.4 Utilities

5.4.1 Project Management



Company Name	The company name of the production company
Project Code	The code or name of the project
IC Part Number	The part number of IC used
Person in Charge	The person that are in charge of the project
Enable Ext VDD	Option to enable external VDD
Min	Show the minimum external VDD (change min VDD value by clicking up/down arrow)

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Max	Show the maximum external VDD (change max VDD value by clicking up/down arrow)
Password Protected	Option to enable password protection
Enter password	Text Box for entering password
Reenter password	Text Box for re-entering password
Show Password	Option to show password
Lock	Option to lock the password
Enable Blank Check	Option to enable blank check
OK	Confirm the options selected
Cancel	Discard the options selected

Write Project Information

The project information can be saved into a project file for permanent storage. This information will display in LCD after Code Update.

Set External VDD

If the target board requires external VDD for trimming, it can be set through this option. The tolerance can be set by changing the minimum and maximum value.

Set Blank Check

If user requires perform blank check, it can be set through this option.

Authentication

Password can be set to lock the project file information so that it is impossible to be changed by others. When the project file is locked, programmer will only allow user to perform Code Update. To enable locking, type in password, and then click **Lock** in the project info window. To unlock the setting, type in the password again, and click **Unlock**. If you are unsure of what you typed, click the option **show password** to see what you typed without asterisks.

Save Project

This option allows you to save the project setting in order to be retrieved later, or to be loaded to another OTP Programmer Client. To save project, click **save project** from the **File** tab of the **Menu** bar and choose the right directory and file name to save it.

Load Project

This option allows user to load the project setting saved earlier. It is especially handy when user had a lot of different projects on hands. To load project, click **load project** from the **File** tab of the **Menu** bar and choose the appropriate file to load in.

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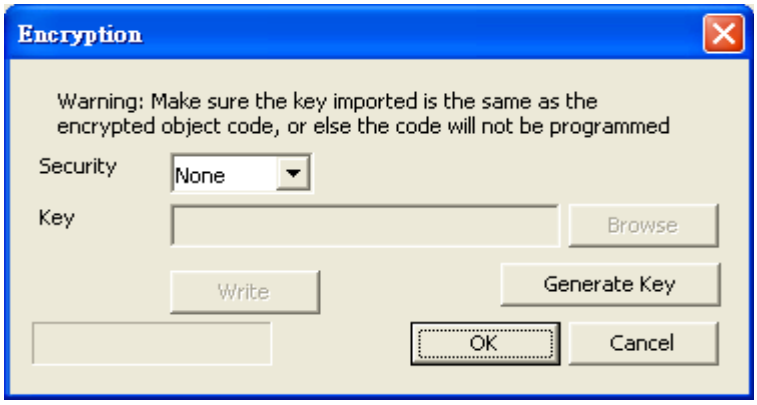
5.4.2 Encryption



Key	32 byte long encryption key
Browse	Option to choose the file which contains the key
Write	Write the encryption key into the Programmer
OK	Confirm the setting. If a new key is imported or generated and the programmer is connected to the PC, the new key will be written to the programmer.
Cancel	Discard the setting
Security	Mode 1 : Set Encryption Key with mode 1 Mode 2 : Set Encryption Key with mode 2 None : Disable Encryption Key (Default)
Generate Key	Generate a random key. If there is an existing key, the newly generated key will be saved in the same directory of the existing key, else it will be saved in the application directory. The generated key will be named as “GenKey.txt”. The existing generated key will be renamed as “GenKeyBak.txt” if it found in the same location.

Write Encryption Key

To write an encryption key into the programmer, first import the key from a standard txt file by pressing **Browse**, then choose the directory the txt file is in. Verify that the key display on the status box is indeed the key desired. Press **Write** to write the key into the programmer. A successful message will appear in case a successful write is performed.

Security

Mode 1 and Mode 2 use different encryption method, Mode 2 is faster when programming.

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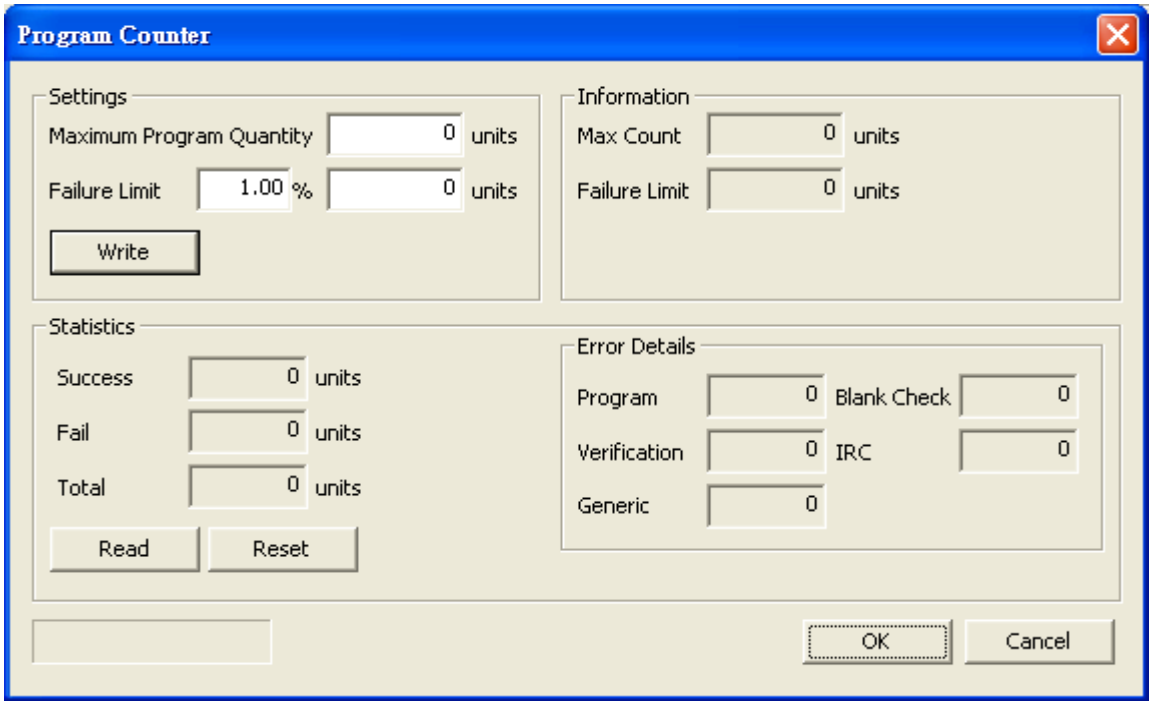
5.4.3 Program Counter



Maximum Program Quantity	Set the maximum number of time user want to program
Failure Limit (Percentage or Absolute Number)	Set the limit of programming failure rate
Write	Save the option into the device
Max Count	Display Maximum Program Quantity
Failure Limit Display	Display Failure Limit
Success	Number of time of successful programming
Fail	Number of time of failed programming
Total	Number of time total programming attempts
Program	Error occurred during programming stage
Verification	Error occurred during verification stage
Generic	Generic error occurred
Blank Check	Error occurred during blank check stage
IRC	Error occurred in setting IRC in programming mode
Read	Option to read out statistics from programmer
Reset	Option to reset the statistics to zero in programmers
OK	Confirm the setting. If the Program Quantity or Failure Limit has changed and the programmer is connected to the PC, the new value will be written to the programmer

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Cancel	Discard the setting

Write Program Counter

Set the maximum number of programming attempts into the **Maximum Program Quantity**. Then set the **Failure Limit** by either as a percentage of the **Maximum Program Quantity,** or as an absolute number. Then press **Write** to update the programmer with the latest setting.

Note:

If the program counter is set to 0, the programmer can program unlimited MCU. For security reason, it is not recommended to set programmer to 0.

In the sake of preventing incautious change of maximum program quantity, the programmer will verify the imported encryption key and the key stored in the programmer board before changing the value.

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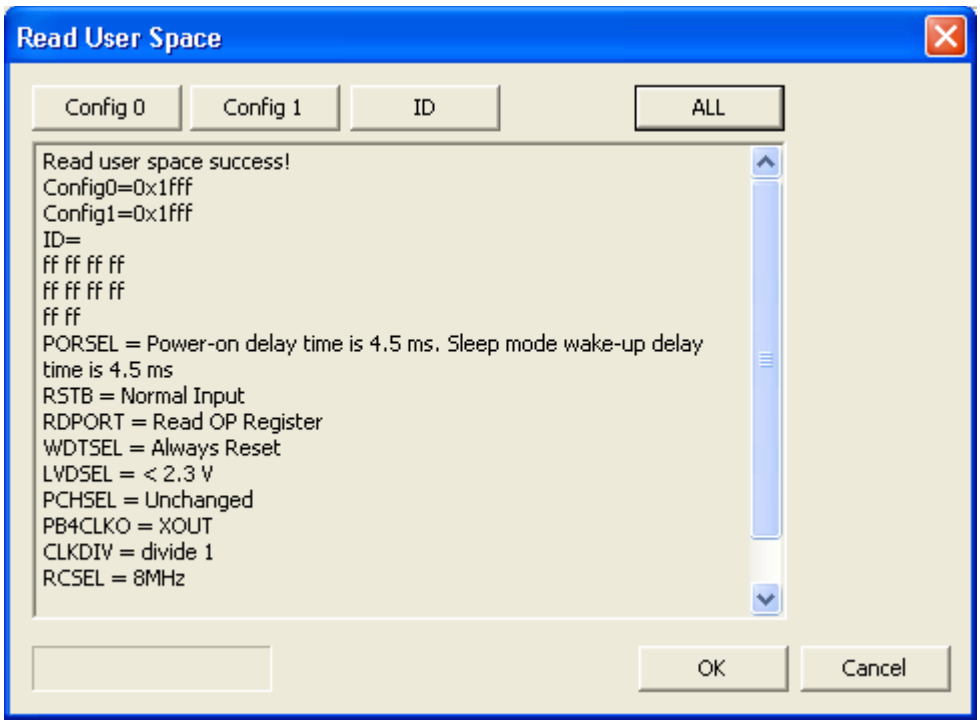
5.4.4 Read User Space

User Space allows the user to store custom ID and other user defined information for their own purposes. For example, in APG012 up to 2 Config values of 13 bit length, and ID of 10 bytes can be stored.



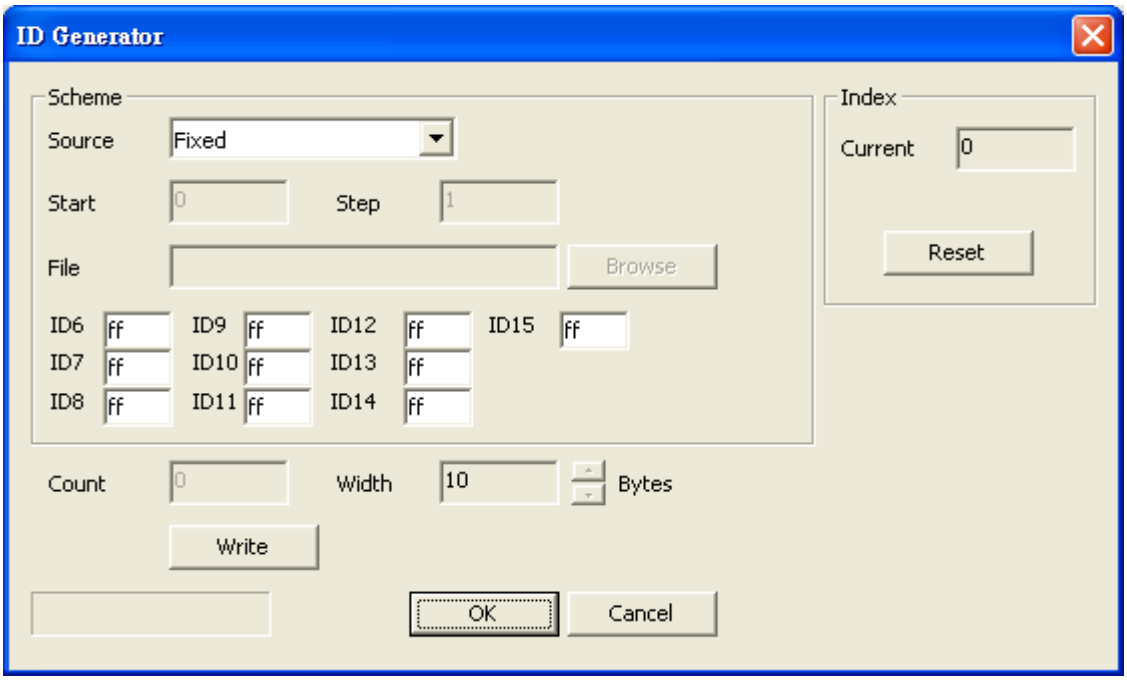
Config 0	Display UserSpace Config 0
Config 1	Display UserSpace Config 1
ID	Display UserSpace ID
ALL	Display All UserSpace Information
OK	Confirm the setting
Cancel	Discard the setting

Note:
Not all the MCU support Read User Space function. It depends on the MCU selected.

5.4.5 ID Generator

Fixed ID

This option allows a fixed ID to be written into the programmer, the same ID will be programmed into the MCU for each attempt of programming. The fixed ID should be 10 bytes in length.



Source	Choose for Fixed, Auto ID, or import File
ID[6-15]	Entries for entering fixed ID
Current	Current index in Programmer
Reset	Reset the index to zero
Write	Save the setting into programmer
OK	Confirm the setting. If the mode or the ID has been changed, the new setting will be saved and written to the programmer.
Cancel	Discard the setting

Note:
Not all the MCU support ID generator function. It depends on the MCU selected.

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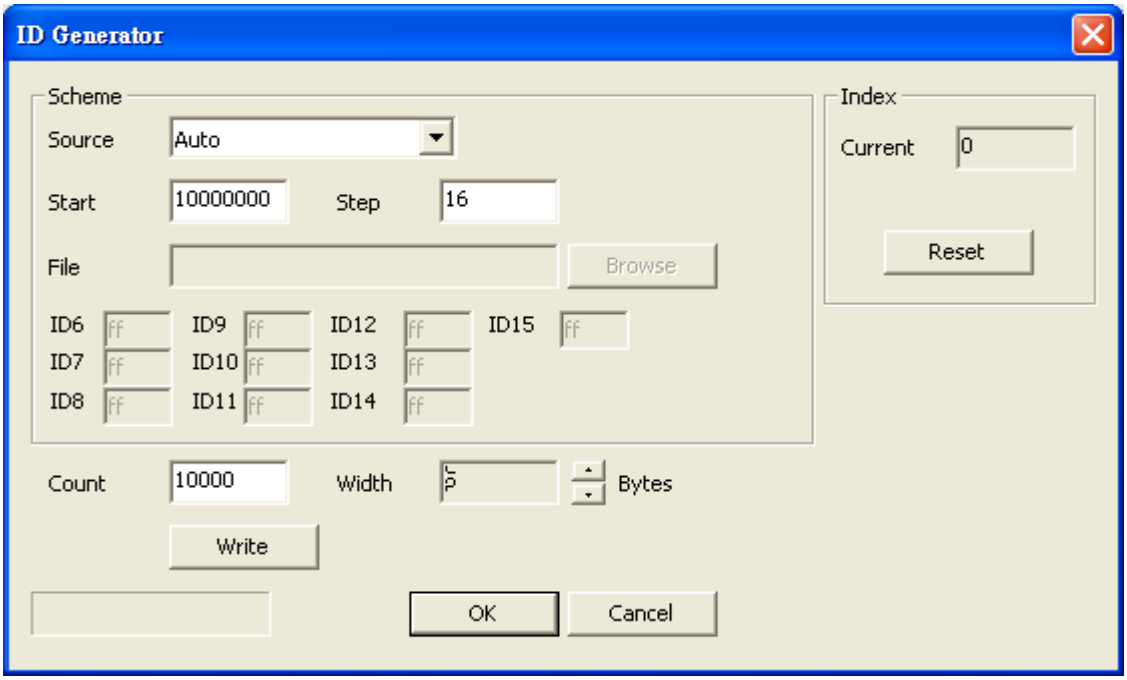
Auto

This option allows the programmer to auto-increment the value of ID for each programming attempts.



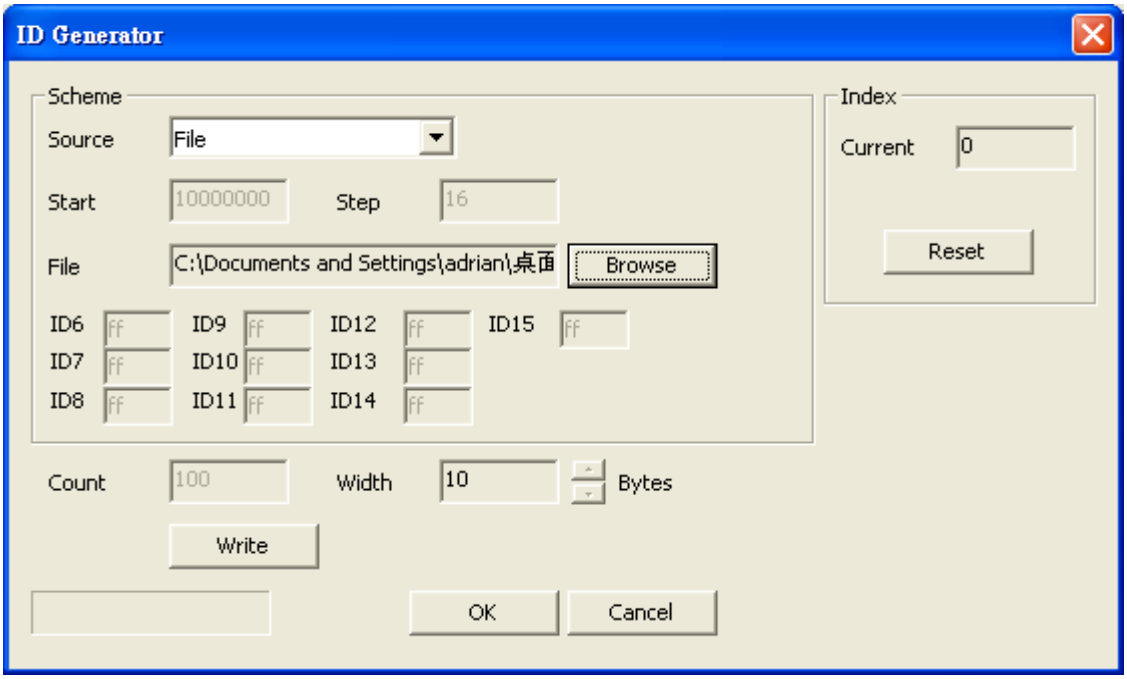
Source	Can choose for Fixed, Auto ID, or import File
Start	Start ID
Step	Step for increment
Count	Total number of increment
Width	Width of ID
Reset	Reset the index to zero
Write	Save the setting into programmer
OK	Confirm the setting. If the mode or the ID has been changed, the new setting will be saved and written to the programmer.
Cancel	Discard the setting

Note:

Not all the MCU support ID generator function. It depends on the MCU selected.

File

This option allows the user to import a number of IDs from a CSV (comma separated values) file containing the IDs. The File should have a header start with “ID”, and follow by entries of IDs of width from 2 bytes to 10 bytes (4 hexes to 20 hexes, 2 hexes represent 1 byte).



Source	Can choose for Fixed, Auto ID, or import File
File	File in directory to be imported
Current	Current index in Programmer
Reset	Reset the index to zero
Write	Save the setting into programmer
OK	Confirm the setting. If the mode or the ID has been changed, the new setting will be saved and written to the programmer.
Cancel	Discard the setting

Note:

Not all the MCU support ID Generator function. It depends on the MCU selected

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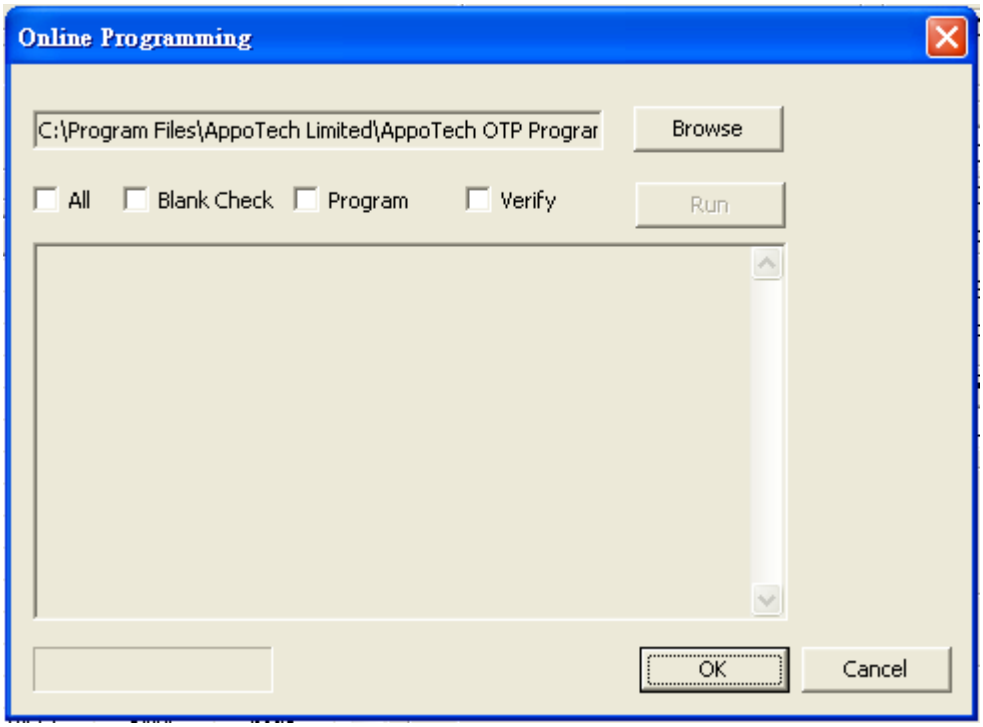
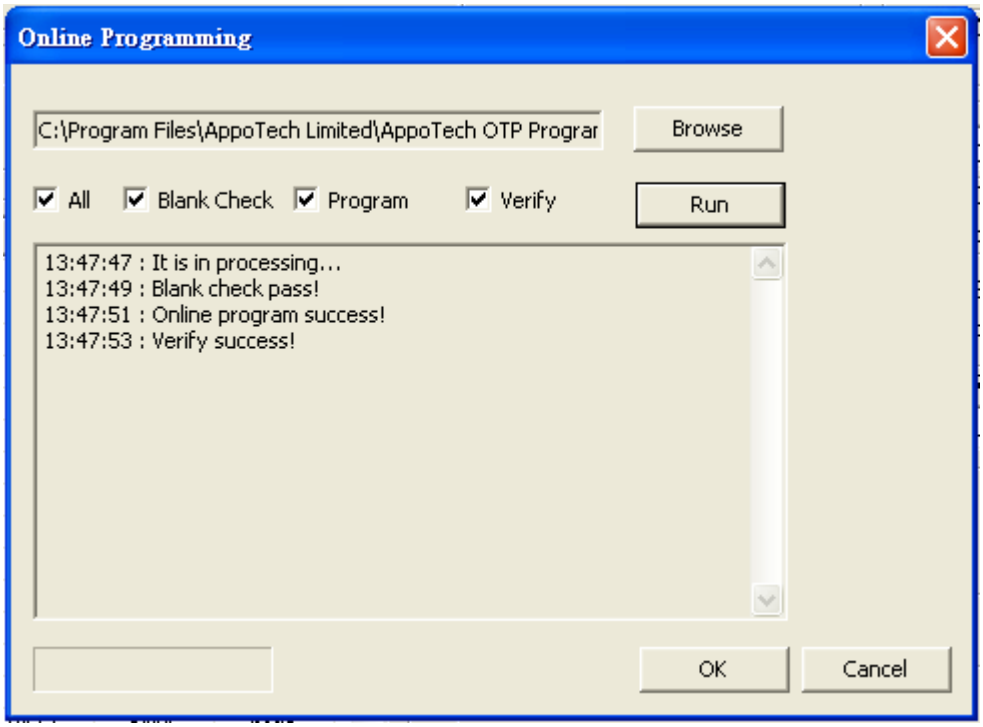
5.4.6 Online Programming

Online Programming allows the programmer to program devices through the computer client.



All	Do all the options, include blank check, program, verify.
Blank Check	Include Blank Check
Program	Include Program
Verify	Include Verify
Run	Run the options selected
Browse	Import the project file to be programed.
OK	Confirm the setting
Cancel	Discard the setting

Note:
Project file must exist to perform Program and Verify function.



If the all three operations are successful, the above message appear. It also shows the timestamps for each operation.

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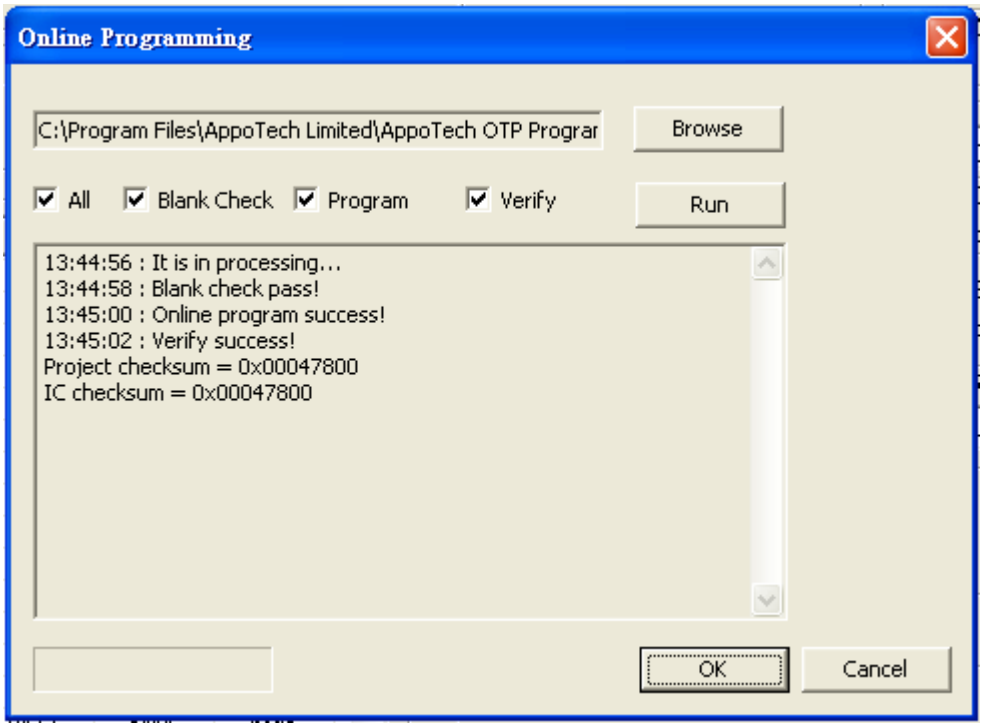
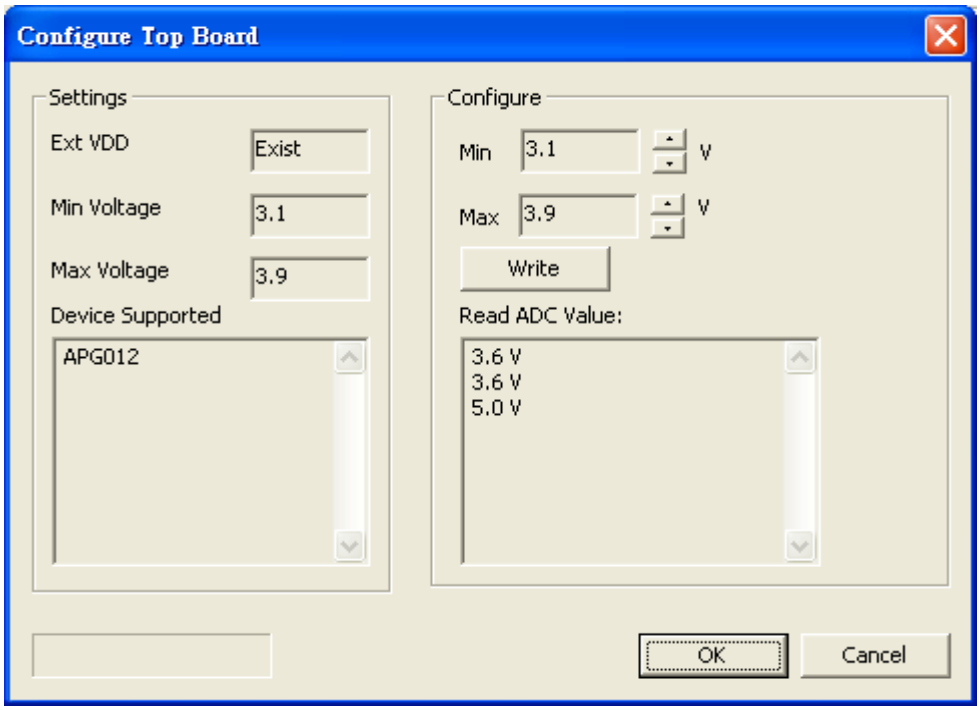


For MCU except AX688, check sum are displayed after verify.

Note:

To allow the programmer to be able to use online programming, one must ensure that the programmer client had opened a project file before entering the online program dialog.

5.4.7 Configure Top Board



Ext VDD	Show the status of External VDD
Min Voltage	Show the minimum voltage configured on top board
Max Voltage	Show the maximum voltage configured on top board
Device Supported	Show the devices supported by Top Board
Min	Set the minimum voltage
Max	Set the maximum voltage
Write	Save the setting into the programmer
Read ADC Value	Display the Read ADC Value
OK	Confirm the setting. If the Min or Max voltage has changed and the programmer is connected to the PC, the new value will be written to the programmer.
Cancel	Discard the setting

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Set Top Board's External VDD

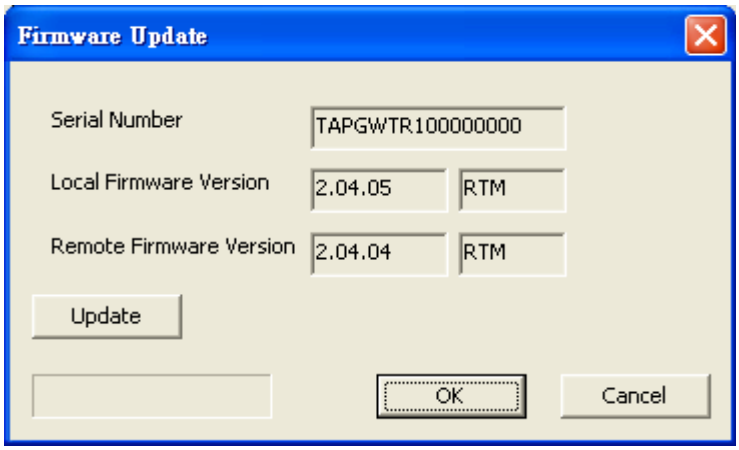
In case the Target MCU's External VDD is not the default value, it is necessary to change the value in order to program the MCU correctly and safely. To do so, select **Configure Top Board** from the **Tools** tab.

Note:

Make sure that the applied VDD is correct, otherwise the trimming value will be wrong or program will fail.

5.4.8 Firmware Update

Firmware Update allows the OTP Programmer to be updated with the newest firmware.



Update	Update the programmer with updated firmware
OK	Confirm the setting
Cancel	Discard the setting

Note:
Do not press **Update** if the Local Firmware Version happens to be newer than the Remote Firmware Version. A warning message will pop up and the upgrade will not proceed.

5.4.9 Firmware Update in Recovery Mode

If the firmware of the programmer is crashed and cannot start the programmer normally, user can force the OTP Programer to recovery mode.

User need to power off the OTP Programmer. Then hold the PROGRAM button and MODE button for 3 seconds.

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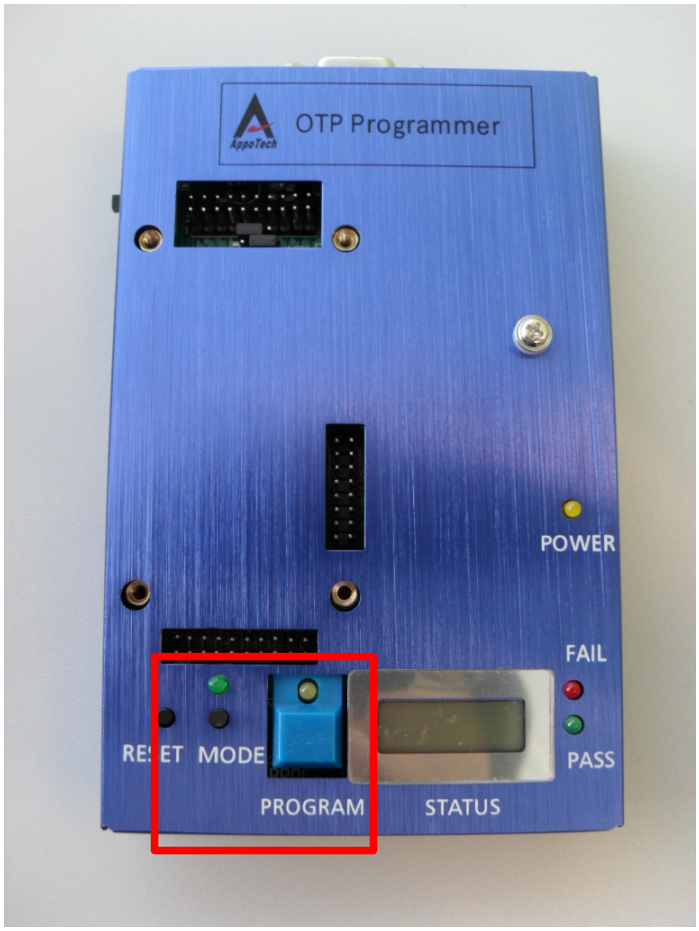

After that, power on the OTP Programmer to enter the recovery mode. After the user starts the application, a warning message will pop out and help the user to update the firmware.

6 Hardware Issues

6.1 Hardware Overview

An OTP Programmer consists of the Top board and Mainboard. The Top boards are interchangeable for different packages.

Figure 6-1 shows the hardware outlook of an AppoTech OTP Programmer.

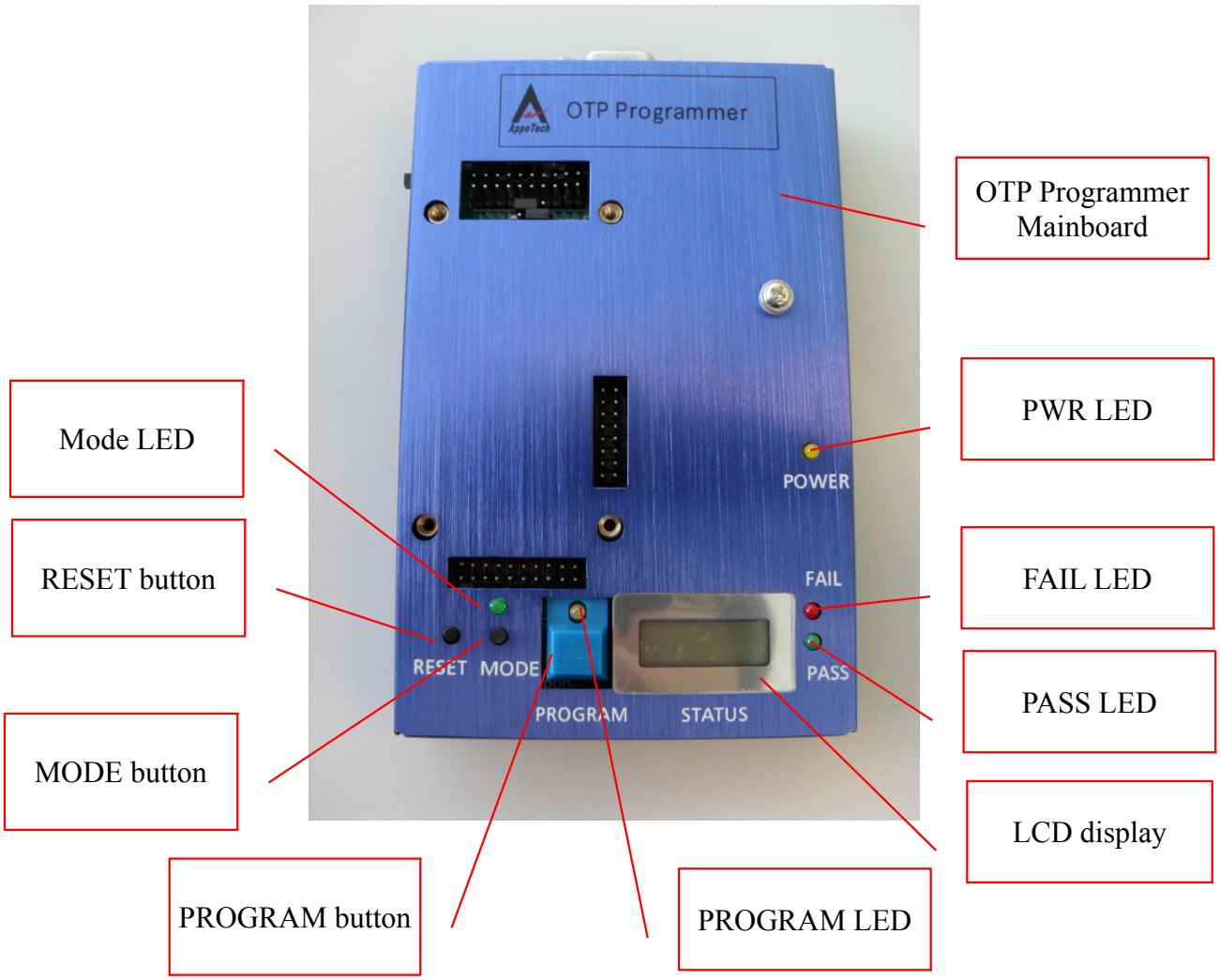

Figure 6-1: AppoTech OTP Programmer Hardware for DIP package

Power On

6.1.1 Boot up and Information display

To power on the OTP Programmer hardware, connect the power cord to the OTP Programmer

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hardware and plug in the power cord to power socket. The PWR LED (yellow) will be on.

Display Project Information during Initialization:

When the OTP Programmer hardware is powered on, it will undergo initialization and display of hardware and project information on the LCD screen. PROGRAM LED (yellow) will blink for user input. User should press PROGRAM button to go to the next screen. After all information screens are shown, the OTP Programmer hardware is ready to program the MCU.

The information displayed on screen during boot up is listed below:

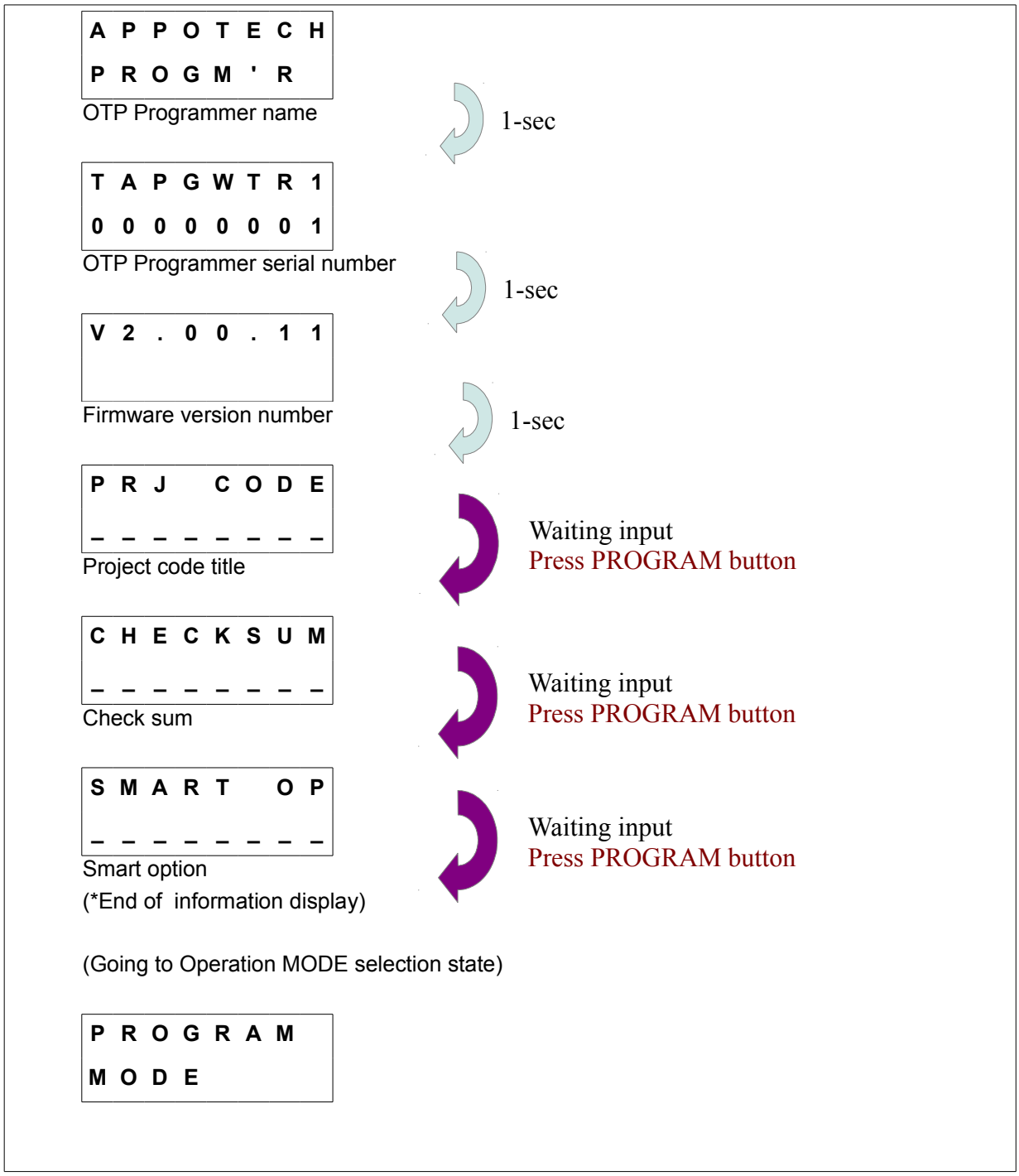
A P P O T E C H
P R O G M ' R
OTP Programmer name
1-sec
T A P G W T R 1
0 0 0 0 0 0 0 1
OTP Programmer serial number
1-sec
V 2 . 0 0 . 1 1
Firmware version number
1-sec
P R J C O D E
_ _ _ _ _ _ _ _
Project code title
Waiting input
Press PROGRAM button
C H E C K S U M
_ _ _ _ _ _ _ _
Check sum
Waiting input
Press PROGRAM button
S M A R T O P
_ _ _ _ _ _ _ _
Smart option
Waiting input
Press PROGRAM button
(*End of information display)
(Going to Operation MODE selection state)
P R O G R A M
M O D E

Figure 6-2: Display Project Information

Note:

If the OTP Programmer does not work as above, press reset button or disconnect the power and connect again until it can run normally. The OTP Programmer can then proceed to the remaining operations.

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6.1.2 Operation Modes

There are 4 operation modes in AppoTech OTP Programmer

1. PROGRAM mode – standalone programming of MCU in assembly house

VERIFY mode – verify, retrieve and show the Smart Options

2. INFO mode – display project information
3. USB mode – connect PC to download project file to OTP Programmer

The message displayed on screen during mode selected are listed below:

1)

PROGRAM mode

2)

VERIFY mode

3)

INFORMATION mode

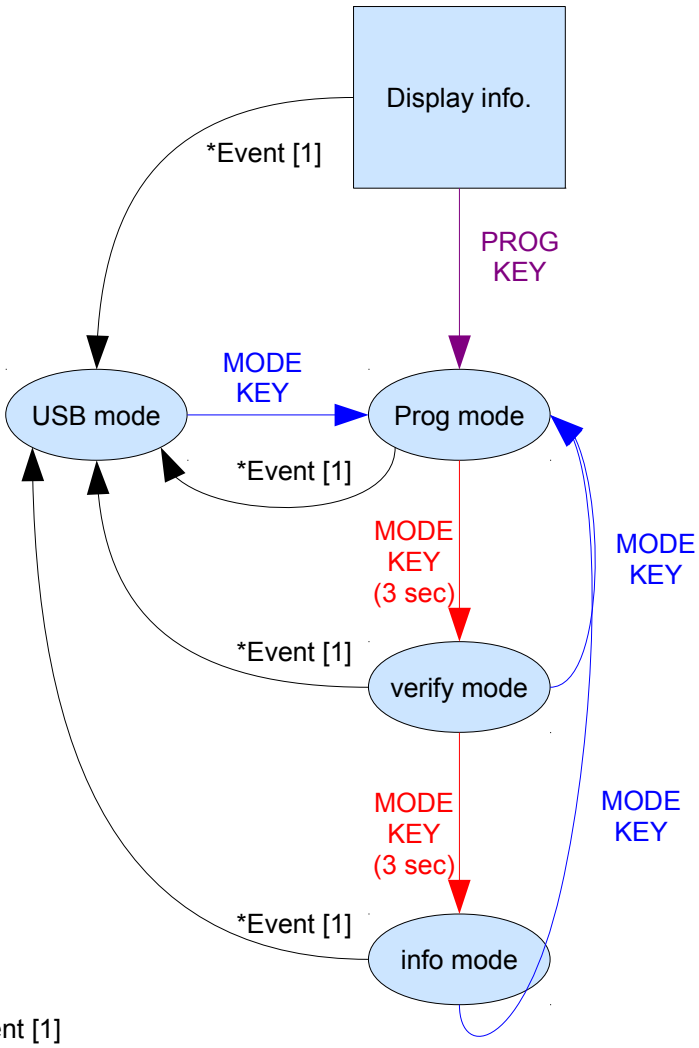
4)

USB mode

6.1.2.1 Switch between Operation Modes

By pressing MODE button, the OTP Programmer cycles modes as following. When the OTP Programmer is in PROGRAM mode, user should hold MODE button for 3 seconds to switch to the next mode, “VERIFY mode”. Beside the USB mode is selected by USB insert and PC application event.

The information displayed on screen during boot up is listed below:



*Event [1]
(This event is triggered by USB inserted and PC application is started)

Figure 6-3: Switching between operation modes

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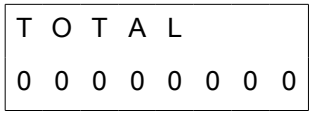
6.1.2.2 PROGRAM Mode

By default, “Program mode” is selected. In the standby condition, the following two pages are displayed alternatively.

Ready message to indicate ready for programming MCU



Upper line: total programmed quantity title

Lower line: value (decimal)

Press the PROGRAM button on the OTP Programmer to start burning the chip. The PROGRAM LED will flash till the process complete or exit due to error, and the result will be displayed on the screen.

- When alert message is shown, user can press MODE button to reset the OTP Programmer alert status.

> **Note:**
> Please refer to Section 6.3 OTP Programmer Alert Status for detailed programmer alert status information.

- When blank check fails and alert is prompted, user can continue to the process by pressing PROGRAM button again. Otherwise, user should remove the chip and press MODE button to reset the OTP Programmer alert status.

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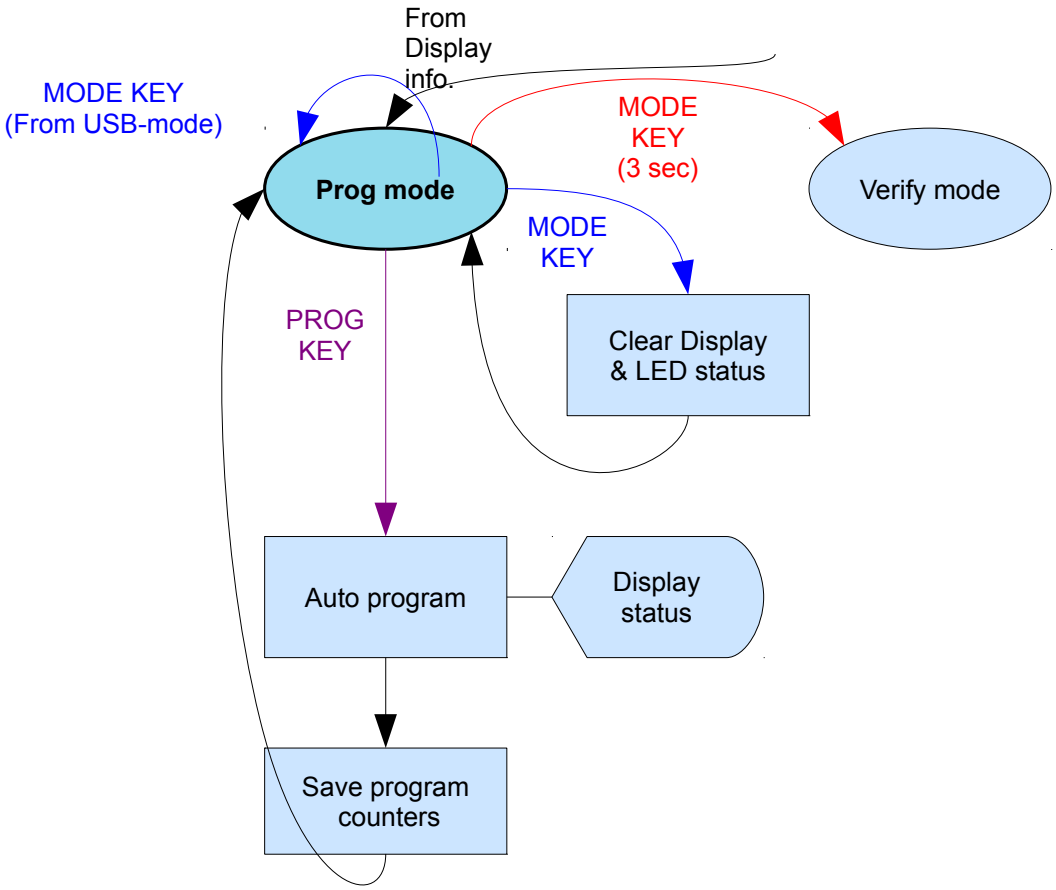

Figure 6-4: Flowchart in PROGRAM mode

- After a successful process, "OK" screen and other information displayed are listed below:

O K

After 1 sec, the following pages are shown alternatively.

1 F C F 1 F E F
1 F C F 1 F E F

Line 1: target smart options
Line 2: read back values

1 0 0 0 K H Z
9 9 9 K H Z

Line 1: target IRC frequency
Line 2: measured IRC frequency after program

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6.1.2.3 Verify mode

In Verify Mode, the verified result, code's check sum and smart options information of the inserted MCU are shown.

Procedures:

1. Switch to VERIFY Mode
2. Insert an MCU on the socket
3. Press PROGRAM button
4. The following information will be shown on the LCD display

- Case-1 : Blank

```
B L A N K
O K
```

The MCU is blank

- Case-2: Not Blank , Verify pass

```
O K       _ _ _ _
1 F F F 1 F F F
```

Line1: (Verify result)(Check Sum)
Line2: (Smart Option 1)(Smart Option 0)

- Case-3: Not Blank , Verify Fail

```
F A I L _ _ _ _
1 F F F 1 F F F
```

Line1: (Verify result)(Check Sum)
Line2: (Smart Option 1)(Smart Option 0)

Note:

Smart Options are only available in a chosen selection of MCU, such as APG012. Please check the corresponding Product Specification if this option is available on your target MCU.

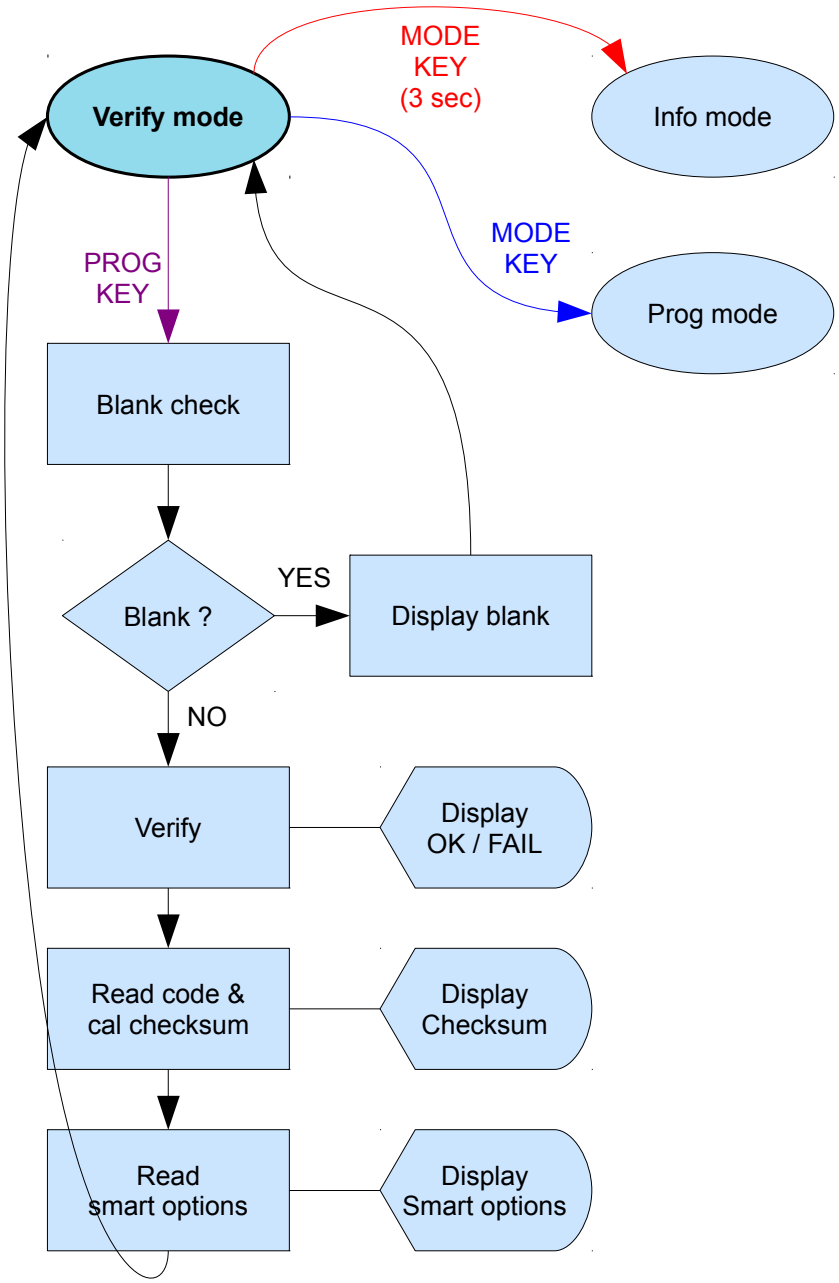

Figure 6-5: Flowchart in PROGRAM mode

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6.1.2.4 INFO Mode

Pressing PROGRAM button will display the hardware and project information, same as the one shown during OTP Programmer Initialization (Refer to Figure 6-2). User should also read out all information before the OTP Programmer continues process.

Press Mode button to switch to PROGRAM mode.

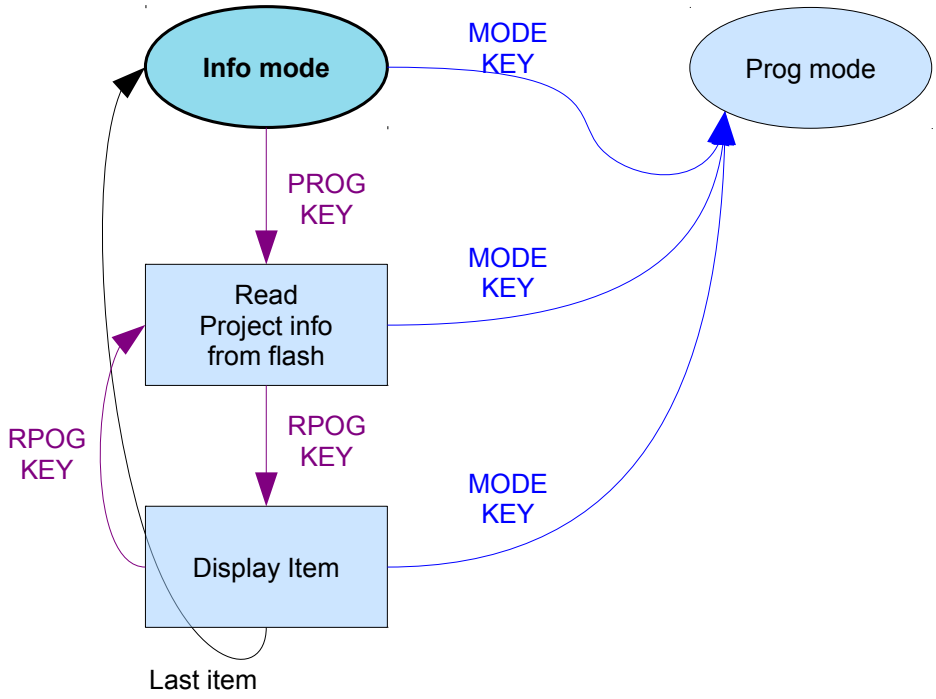


Figure 6-6: Workflow in INFO mode

The information displayed on screen are listed below:

I N F O **M O D E**

Information mode selected

Waiting input
Press PROGRAM button

C O M P A N Y **N A M E**

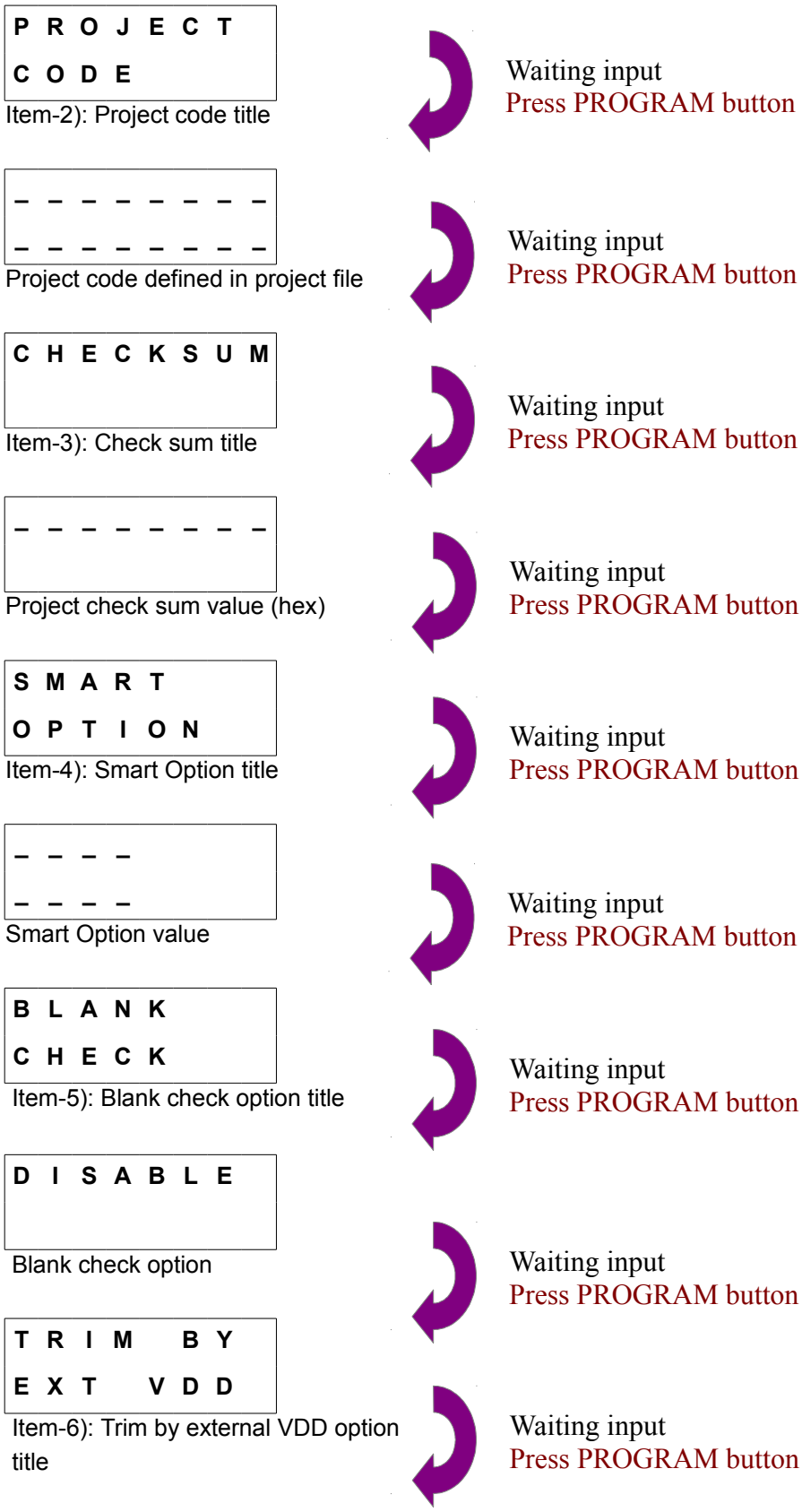
Item-1): Company name

Waiting input
Press PROGRAM button

– – – – – – – – **– – – – – – – –**

Company name defined in project file

Waiting input
Press PROGRAM button


P R O J E C T
C O D E
Item-2): Project code title
Waiting input
Press PROGRAM button
– – – – – – – –
– – – – – – – –
Project code defined in project file
Waiting input
Press PROGRAM button
C H E C K S U M
Item-3): Check sum title
Waiting input
Press PROGRAM button
– – – – – – – –
Project check sum value (hex)
Waiting input
Press PROGRAM button
S M A R T
O P T I O N
Item-4): Smart Option title
Waiting input
Press PROGRAM button
– – – –
– – – –
Smart Option value
Waiting input
Press PROGRAM button
B L A N K
C H E C K
Item-5): Blank check option title
Waiting input
Press PROGRAM button
D I S A B L E
Blank check option
Waiting input
Press PROGRAM button
T R I M B Y
E X T V D D
Item-6): Trim by external VDD option title
Waiting input
Press PROGRAM button

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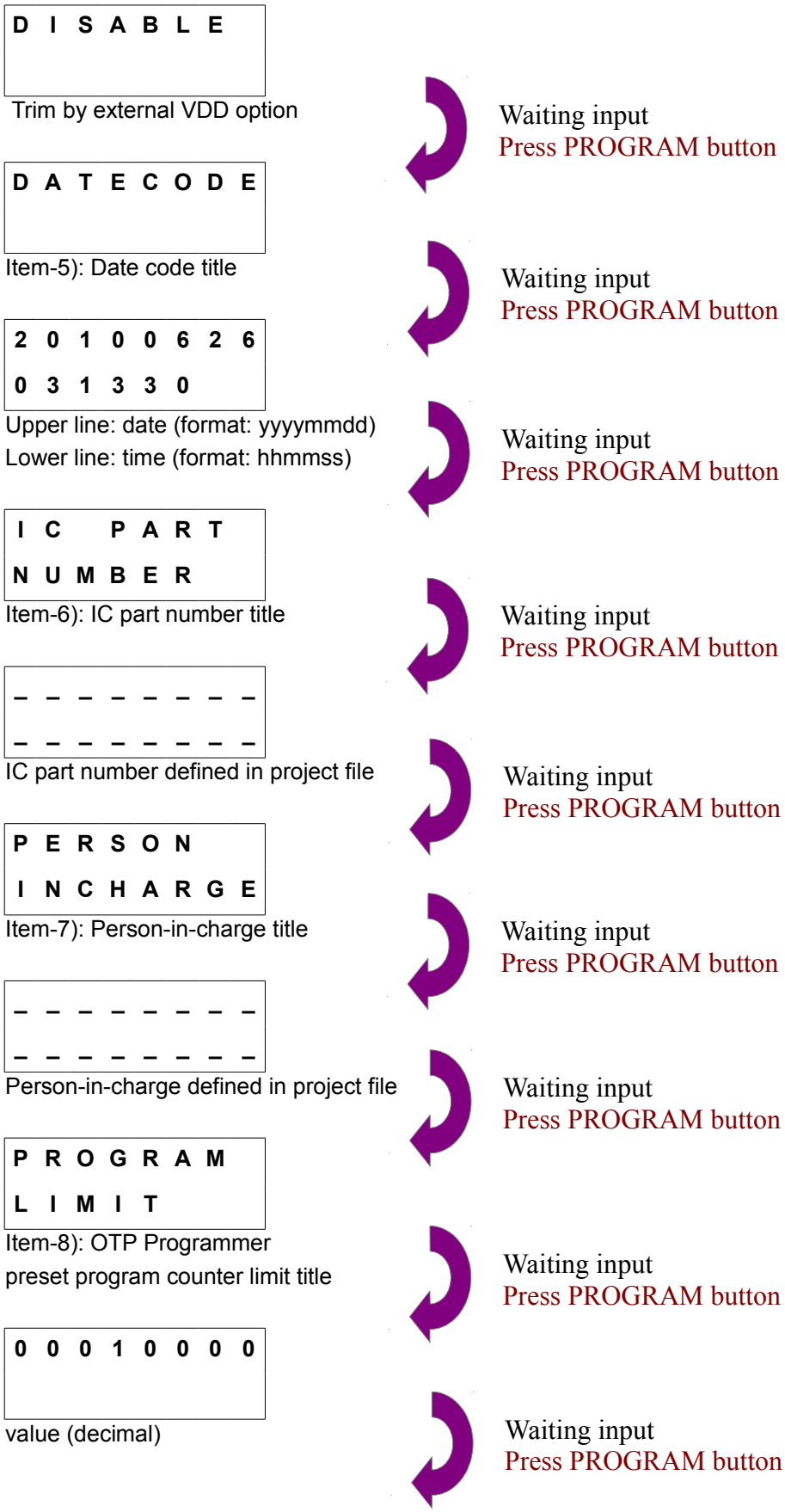
D I S A B L E
Trim by external VDD option
Waiting input
Press PROGRAM button
D A T E C O D E
Item-5): Date code title
Waiting input
Press PROGRAM button
2 0 1 0 0 6 2 6
0 3 1 3 3 0
Upper line: date (format: yyyymmdd)
Lower line: time (format: hhmmss)
Waiting input
Press PROGRAM button
I C P A R T
N U M B E R
Item-6): IC part number title
Waiting input
Press PROGRAM button
– – – – – – – –
– – – – – – – –
IC part number defined in project file
Waiting input
Press PROGRAM button
P E R S O N
I N C H A R G E
Item-7): Person-in-charge title
Waiting input
Press PROGRAM button
– – – – – – – –
– – – – – – – –
Person-in-charge defined in project file
Waiting input
Press PROGRAM button
P R O G R A M
L I M I T
Item-8): OTP Programmer
preset program counter limit title
Waiting input
Press PROGRAM button
0 0 0 1 0 0 0 0
value (decimal)
Waiting input
Press PROGRAM button

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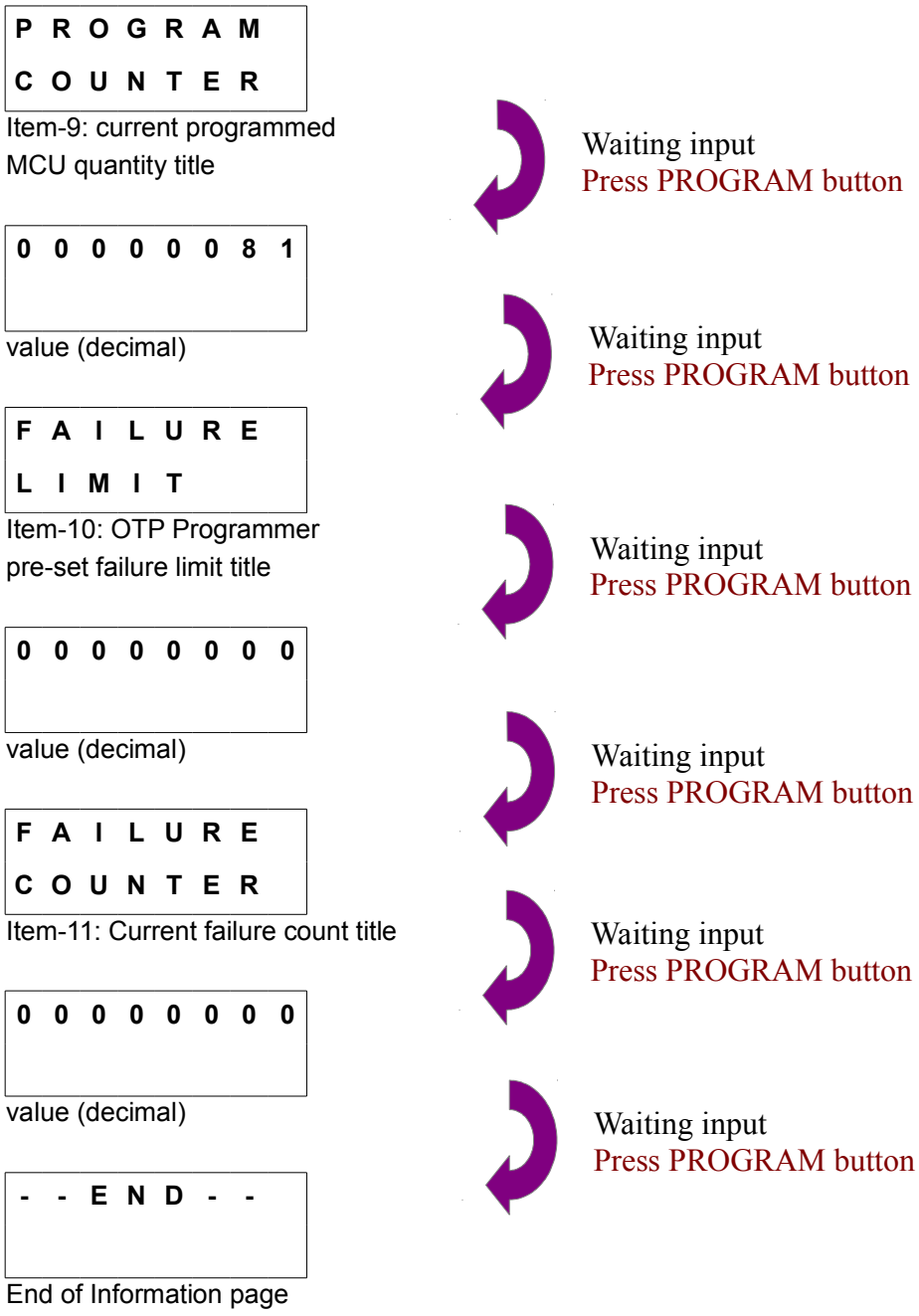
P R O G R A M
C O U N T E R
Item-9: current programmed MCU quantity title
0 0 0 0 0 0 8 1
value (decimal)
F A I L U R E
L I M I T
Item-10: OTP Programmer pre-set failure limit title
0 0 0 0 0 0 0 0
value (decimal)
F A I L U R E
C O U N T E R
Item-11: Current failure count title
0 0 0 0 0 0 0 0
value (decimal)
- - E N D - -
End of Information page
Waiting input
Press PROGRAM button
Waiting input
Press PROGRAM button
Waiting input
Press PROGRAM button
Waiting input
Press PROGRAM button
Waiting input
Press PROGRAM button
Waiting input
Press PROGRAM button

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6.1.3 USB Mode

In USB Mode, PC software will take over control.

The PROGRAM button is only activated after some program instructions are issued to the OTP Programmer by PC software. User can press PROGRAM button to reset alert status,

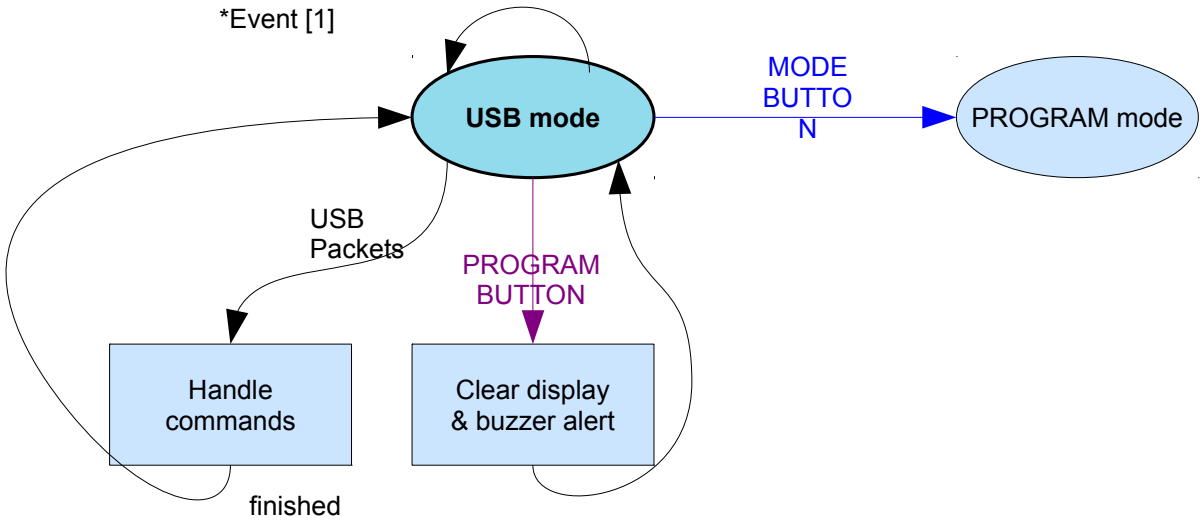

Figure 6-7: Workflow in USB mode

6.2 Insert MCU

Insert the chip into the most bottom position of the socket. IC pins should be placed tightly to the metal guidelines in the socket. For Details, please refer to OTP Programmer Quick Start Guide (TAPGWTR1-QS-023V02-EN).

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6.3 OTP Programmer Alert Status

The status of OTP Programmer can be identified by the LCD message according to the following table:

Signal	Status	LCD Message
PASS LED (Green): toggle FAIL LED (Red): toggle Buzzer: off	Ready	PROGRAM RDY
PASS LED (Green): on FAIL LED (Red): off Buzzer: once	Program mode: • Success	OK
	Verify mode: • Blank check pass	BLANK OK
	Verify mode: • Verify pass	OK ---- --------
	Verify mode: • Verify fail	FAIL---- --------
PASS LED (Green): off FAIL LED (Red): on Buzzer: twice	Program mode: • blank check fails	NOT BLANK
	Program mode: • Verify fail	VERIFY FAIL
	Program mode: • Trim fail	TRIM FAIL
	General • Invalid target	INVALID TARGET
PASS LED (Green): off FAIL LED (Red): on Buzzer: ring	Blank check timeout	BLANKCHK TIMEOUT
	Program timeout	CONFIG TIMEOUT
	Verify timeout	VERIFY TIMEOUT
PASS LED (Green): toggle FAIL LED (Red): toggle Buzzer: ring	No top board found	NO BOARD
PASS LED (Green): off FAIL LED (Red): toggle Buzzer: ring	No target MCU found	NO CHIP
PROGRAM LED: toggle UPDATE LED: toggle Buzzer: ring	Failure limit reached	FAIL LMT REACH
	Program limit reached	PROG LMT REACH
	System error	SYSTEM ERROR
	Invalid top board	INVALID TOPBOARD

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N/A	Unknown error	UNKNOWN ERROR

If user encounters problems, please check for the above alert messages. Please verify that the correct MCU, or the correct top board are correctly inserted into the programmer.

If there are other situations not stated above, or the error is unknown, please disconnect power and reboot the OTP Programmer.

If error persists and users can't solve the problem, please contact our technical support immediately.

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Appendix I Programmer Jumper Settings

MCU	DP1	DP2
APG012/APG013	XXO	OXX
AX688/AX688B/AX684B	XXO	OXX

XX: short together

O: leave open

Appendix II Use external VDD to trim IRC

This section to discuss how to use external VDD to trim IRC.

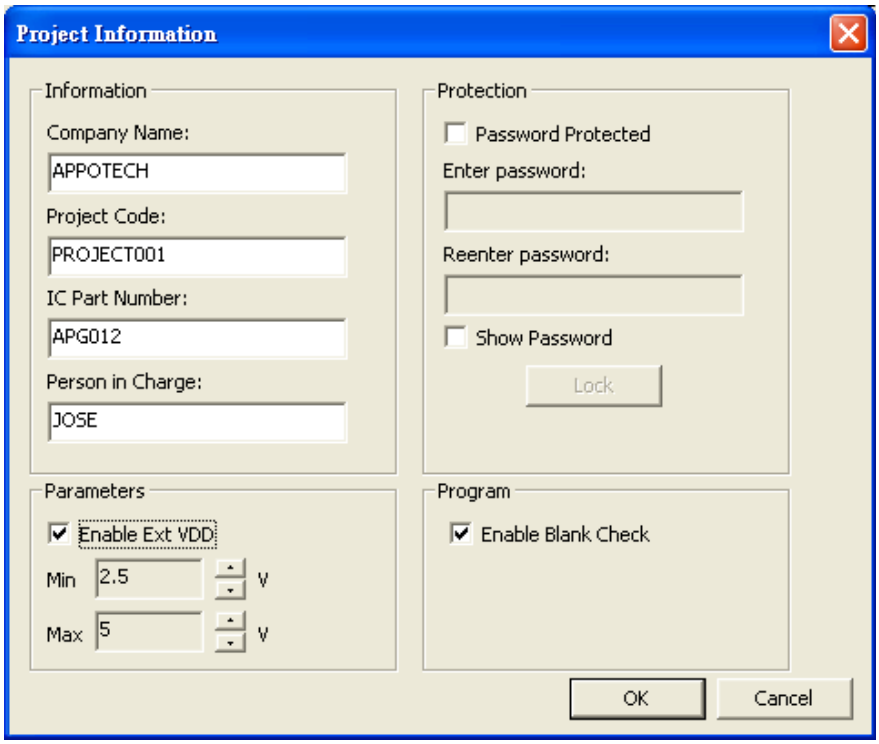
Introduction

IRC Trimming with adjustable voltage could be applied to the programmer by setting project info in the software and setting the switch S1 on the programmer top board.

Target supports trimming with adjustable voltage is listed as follows:

Chip	Support
AX688	No
AX688B	Yes
AX684B	Yes
APG012	Yes
APG013	No

Software Setting



Note:
Don't select "Enable Ext VDD" in project information in unsupported target chips(AX688/APG013)

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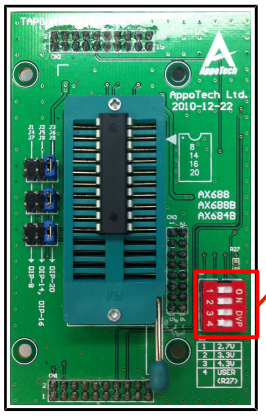
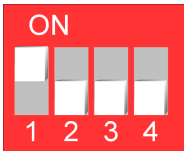
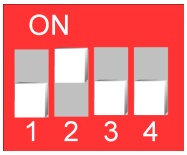
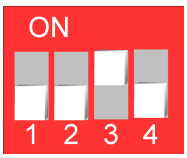
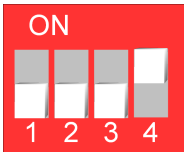
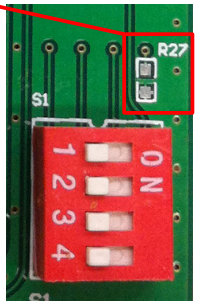
Hardware Setting

1. AX688B/AX684B

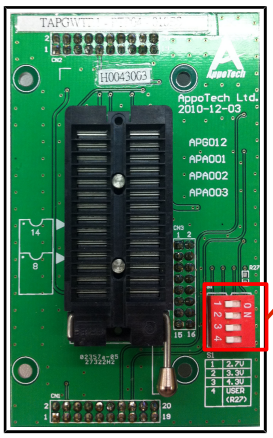
Supporting Top Board : TAPGWTR1-PTP03-010ES
TAPGWTR1-PTP03-010MP
TAPGWTR1-PTP03-011MP

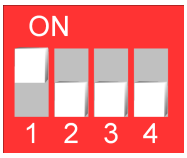
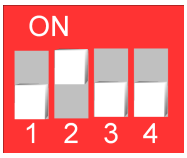
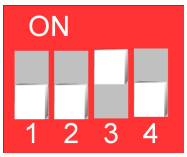
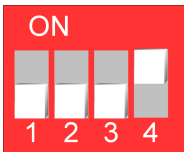
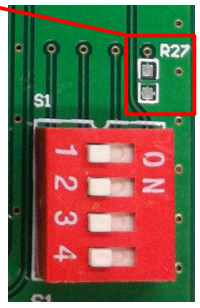


Switch Config	IRC Trim Voltage
	2.7V
	3.3V
	4.3V
	User select(VDD) range: 2.5V ~ 5V Formula: $R27=(Vuser/1.25-1)\times 240$ 

2. APG012

Supporting Top Board : TAPGWTR1-PTP04-010ES
TAPGWTR1-PTP04-010MP



Switch Config	IRC Trim Voltage
	2.7V
	3.3V
	4.3V
	User select(VDD) range: 2.5V ~ 5V Formula: $R27=(Vuser/1.25-1)\times 240$ 

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Appendix III FAQ

This section covers the problems from the basic use of the OTP programmer.

Q: What should I do when Chip Not Found/No Chip is reported?

A: This may be caused when the programmer cannot detect there is a correct MCU on the socket.

1. Check whether the MCU is placed correctly. Refer to OTP Programmer Quick Start Guide (TAPGWTR1-QS-023V02-EN) for correct placement., or
2. Check if the correct target MCU is placed on the programmer, ie.,do not place an AX688 MCU when using AX688B project file, or
3. Replace with another MCU

Q: What should I do when Program timeout is reported?

A: This may be caused by unstable power supply, or discrepancy of IC.

1. Check power supply, or
2. Retry with another IC.

Q: What should I do when check sum error is reported?

A: This may be caused by mismatch of encryption key or project file download fail

1. The key to encrypt the project file (Key 1) and the key existed in programmer board (Key 2) mismatch, download the Key 2 in encryption dialog again.
2. Press Code Update to update the project file to the programmer again.

Q: What should I do when program limit reach error is reported?

A: This may be caused when the number of MCU programmed has reach the program limit set in the programmer.

1. Set/Reset program counter in [Tool] → [program counter]

Q: What should I do when fail limit reach error is reported?

A: This may be caused when the number of failure MCU has reach the fail limit set in the programmer.

1. Set/Reset program counter in [Tool] → [program counter]

Q: What should I do when the programmer failed to start up and halt on the voltage screen?

A: This may be caused by the power supply.

1. The tolerance of VDD and VPP is 5%, check power supply

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Q: Where can I find the driver if I connect the programmer board to PC, and the PC could not find the driver by auto search?

A: This may be caused when the OTP Programmer application has not been installed.

1. Install the OTP Programmer application. For details of software installation, please refer to Chapter 3.1 Installation.

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Appendix IV Revision History

Date	Version	Comment	Revised by
20-AUG-2010	1.0.0	First release	Rimsky Cheng
28-OCT-2010	2.1.0	Merged with Hardware User Manual Added section for existing user Added section for Windows Vista and 7 user	Sam Law
29-OCT-2010	2.2.0	Revised the firmware update section	Sam Law
24-NOV-2010	2.3 RTM	Added section 5.1 to describe how to start application Revised section 5.2: updated changed USB mode method Revised section 5.3: added flowchart and revised UI descriptions Revised section 5.4.4 and 5.4.5: revised notice Revised section 5.4.8: move auto firmware update to 5.4.9 Added section 5.4.9 to describe firmware upgrade Added section 5.4.10 to describe firmware update in recovery mode Revised section 6.1: removed unused picture Revised section 6.2: moved MCU placement to appendix Revised wording of encryption key Added Appendix II to describe MCU placement Update the screenshot in Chapter 5	Sam Law
05-JAN-2011	2.3.2	Updated section 2.1 to remove firmware upgrade Added section 3.2 uninstallation Removed section 5.4.9 firmware upgrade Added FAQ section	Sam Law
02-MAR-2011	2.4.0	Updated section 5.3.4: mentioned object size limitation of APG012A Updated section 5.4.2, 6.2 and Appendix III: revised wording Updated Appendix I: added jumper settings for Removed Appendix II MCU Placement Guide	Sam Law
24-MAR-2011	2.4.1	Updated section 5.4.2: Added descriptions of Generate Key; Updated description of OK button Updated section 5.4.3: Updated description of	Sam Law

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		OK button Updated section 5.4.5: Updated description of OK button Updated section 5.4.6: Added descriptions of Browse; Updated description of OK button and Log Updated section 5.4.7: Updated description of OK button	
14-JUN-2011	2.5.0	Renamed APG012A to APG013 Changed 16-bit checksum to 32-bit Updated section 2.1: Added description of project conversion Updated section 5.3.5: Modified smart option value for APG013 Updated section 5.4.1: Added description of blank check enable Updated section 5.4.2: Mode 2 encryption Updated section 5.4.6: Display checksum after verify success Added Appendix II to describe how to use external VDD to trim IRC	Zack Pang

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